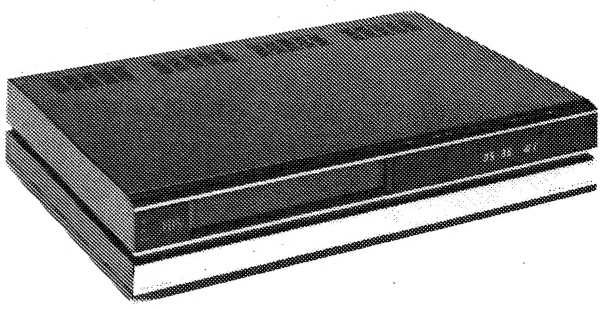
Beocord VHS91

Type 4491-4492-4493

VTR/Video Tape Recorder
ATR/Audio Tape Recorder



TV System

Type 4491
VHF: B
UHF: G

Colour: Pal
Sound: LF Stereo

Type 4492
UHF: I

Colour: Pal
Sound: LF Stereo

Type 4493
VHF: B (S-Tuner)
UHF: G

Colour: Pal
Sound: RF Stereo

SERVICE MANUAL

BEOCORD VHS 91
Type 4491
H

System: VHF-B
UHF-G
Colour: PAL and SECAM modified
Sound: LF Stereo, Dolby*

Tuner IF block	8004540
RF converter	8004542
Regulator REG	8004589
V-S Tuning VS	8004588
Top switch	8004546
Function switch FSW	8004583
Indicators IND	8004584
Infrared receiver INF	8004549
Timer TIM	8004585
Y-chrom WYC	8004577
Jack servo Main JSS	8004606
Audio AUD	8004580
Demodulator DEM	8004581
Remote Control RMT	8004582

BEOCORD VHS 91
Type 4492
BS

System: UHF-I
Colour: PAL
Sound: LF Stereo, Dolby*

Tuner IF block	8004538
RF converter	8004541
V-S Tuning	8004587
Y-chroma WYC	8004576
Jack servo Main JSS	8004578

All other moduls (PCB's) as Type 4491

BEOCORD VHS 91
Type 4493
CT

System: VHF-B S-tuner
UHF-G
Colour: PAL and SECAM modified
Sound: RF Stereo, Dolby*

Tuner IF block	8004595
Timer TIM	8004586
Jack servo Mains JSS	8004579

All other moduls (PCB's) as Type 4491

* Noise reduction system manufactured under license from Dolby Laboratories.
The word Dolby is a trade mark of Dolby Laboratories Licensing Corporation.

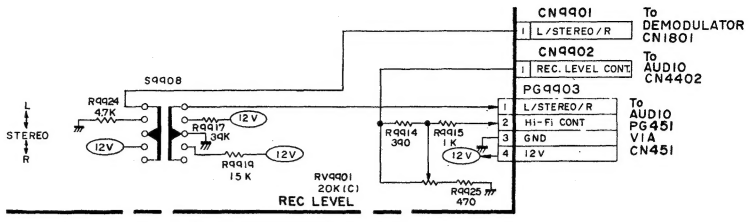
Difference between models are as shown below

	TYPE 4491	TYPE 4492	TYPE 4493
Format	VHS PAL standard	VHS PAL standard	VHS PAL standard
Video	PAL colour (System B & G)	PAL colour (System I)	PAL colour (System B & G)
Aerial Input	VHF channels 2 – 12 UHF channels 21 – 69	UHF channels 21 – 69	VHF channels 2 – 12 UHF channels 21 – 69
RF Output	UHF channels 37 (30 – 37 adjustable) (System G)	UHF channels 37 (30 – 37 adjustable) (System I)	UHF channels 37 (30 – 37 adjustable) (System G)
Power	AC 220V 50 Hz	AC 240V 50 Hz	AC 220V 50 Hz
Timer	24 hour digital indication	24 hour digital indication	24 hour digital indication
CATV *	Not provided	Not provided	Provided

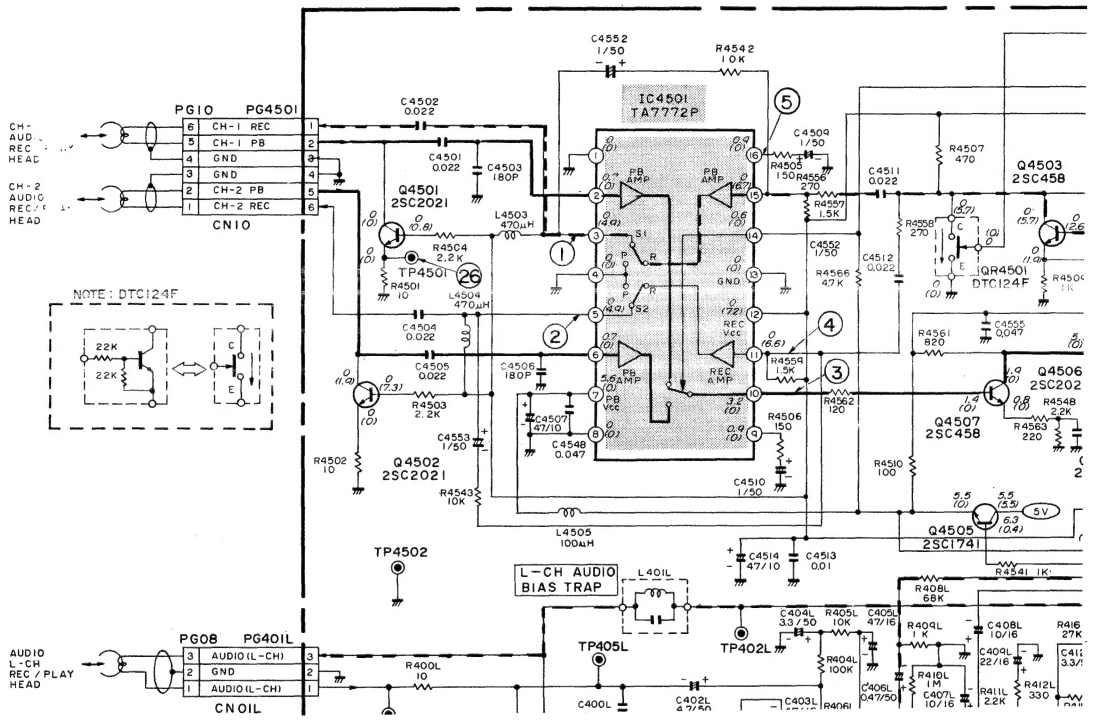
*CATV Cable Television Tuner (S-tuner – Allband tuner)

Corrections for VHS 91

Correction for FUNCTION SWITCH page 1-14 and page 1-30



Correction for AUDIO Hi-Fi LINEAR AUD. 8004580 page 1-26



Bang & Olufsen

Misprint in LINEAR AUDIO CIRCUIT ADJUSTMENT page 6-8

R-ch audio input level: RT402R
Correction:

4) Adjust RT402R (R-CH INPUT LEVEL) so that the reading of the VTVM is 270 mV ±10 mV.

L-ch audio input level: RT402L
Correction:

3) Adjust RT402L (L-CH INPUT LEVEL) so that the reading of the VTVM is 270 mV ±10 mV.

Addition to LINEAR AUDIO CIRCUIT ADJUSTMENT page 6-8

10. E-E Audio Level Adjustment: RT501

This adjustment sets the audio modulation level during the E-E mode to the specified value.
When this adjustment is incomplete, the audio output from the TV during the E-E mode becomes noisy and difficult to hear.

Connecting test equipment

1) Connect a monitor TV to the RF OUT Jack on the rear panel.
2) Connect a VTVM to the audio output of the monitor TV.

VTR condition

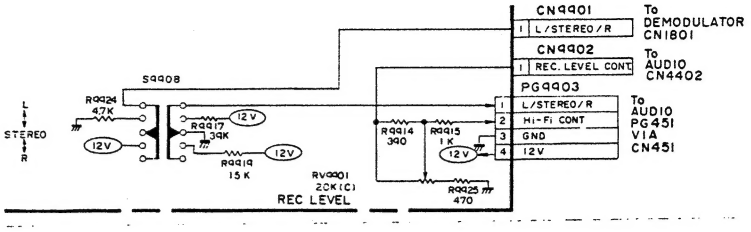
3) Set the VTR to the E-E mode.

Adjustment procedure

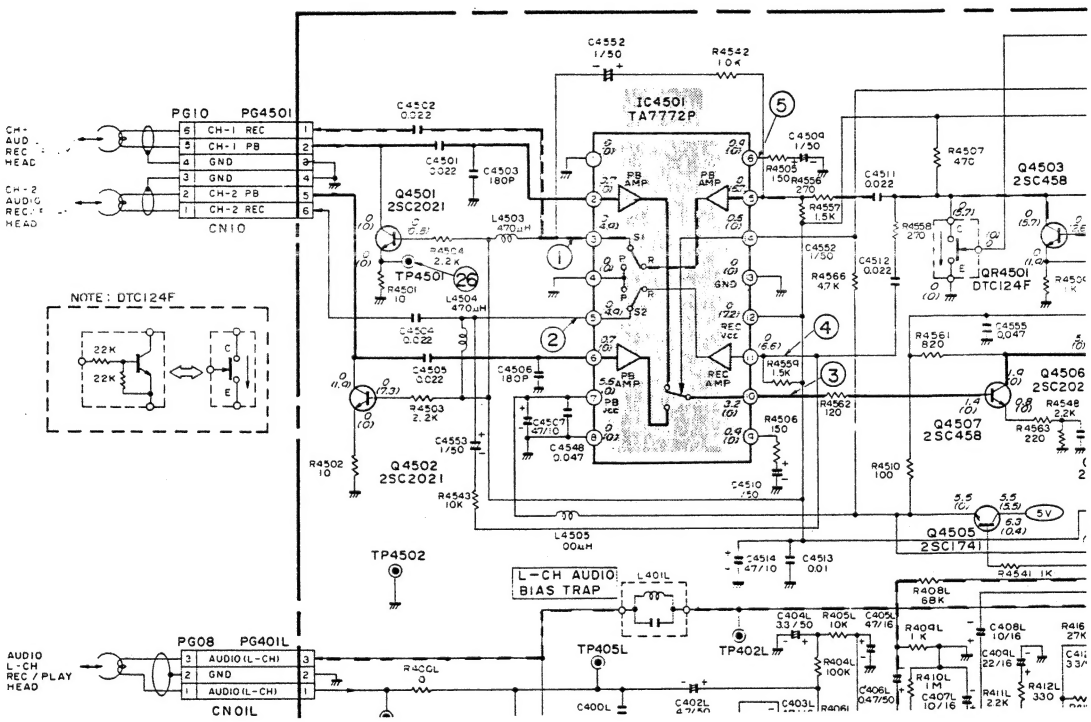
4) Adjust RT501 (on the Main P.C. board) so that the level difference between the THROUGH and E-E modes is less than ±1 dBm based on the THROUGH mode level.

Corrections for VHS 91

Correction for FUNCTION SWITCH page 1-14 and page 1-30

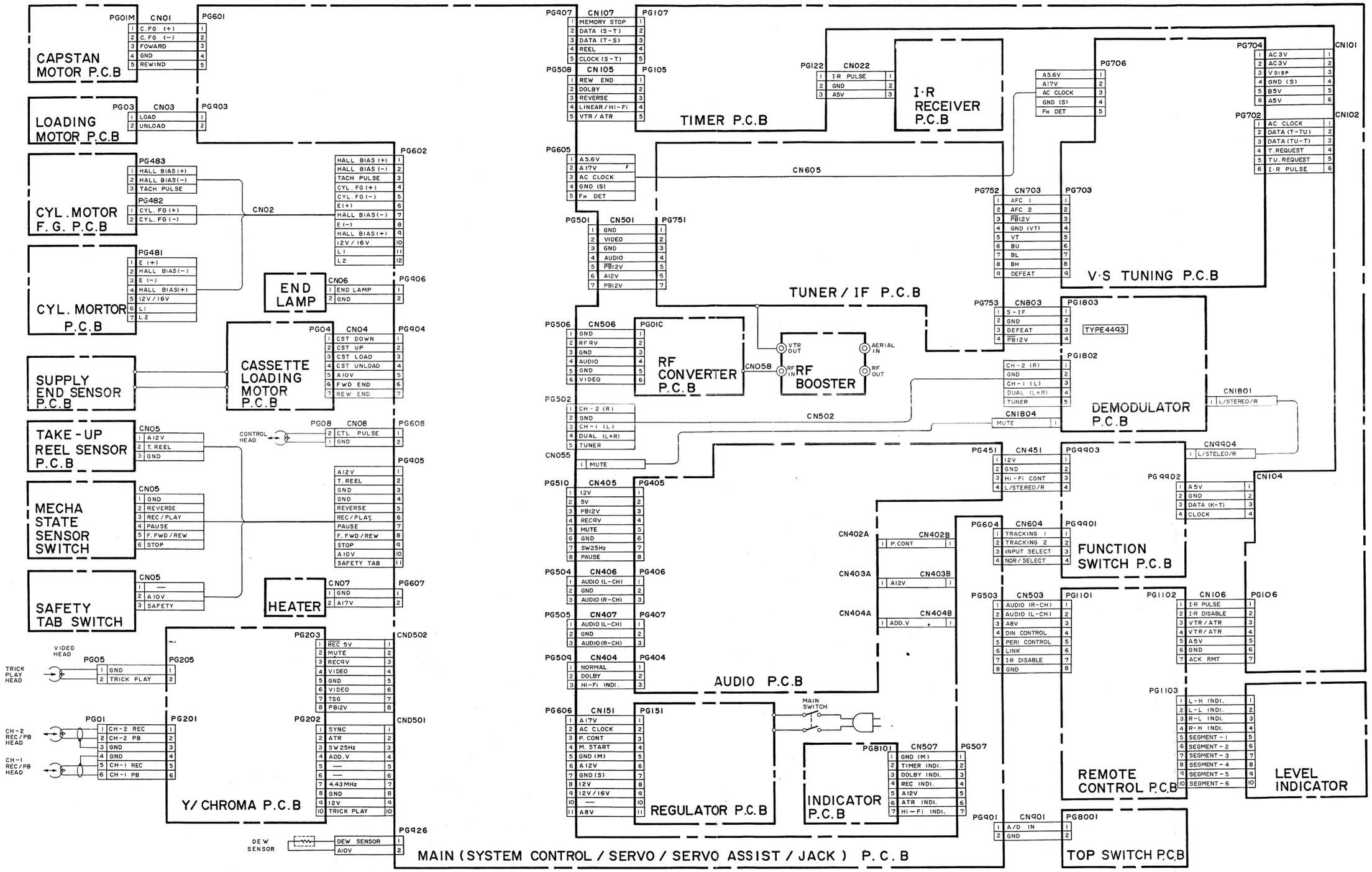


Correction for AUDIO Hi-Fi LINEAR AUD. 8004580 page 1-26

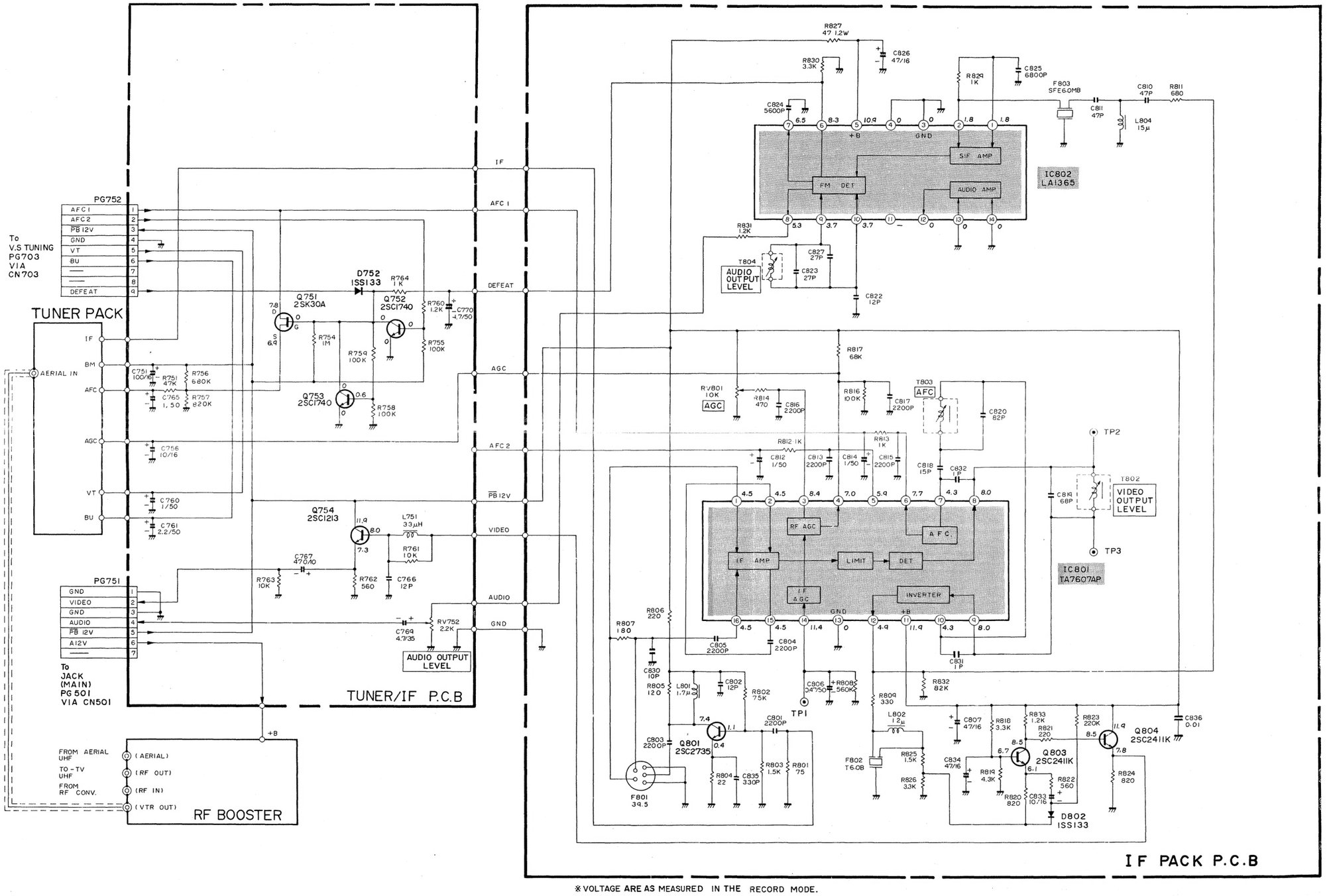


Contents:

OVERALL WIRING DIAGRAM



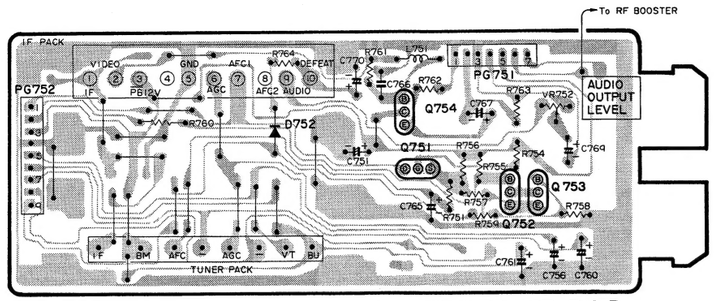
TUNER IF BLOCK FOR UK (BS) TYPE 4492 8004538



※ VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

Tuner IF Block 8004538 is a single unit, and consists of UHF Tuner IF and RF Booster. With failure in this block we recommend replacing.

TUNER IF PCB



TUNER / IF P.C.B

PG752	
1	AFC 1
2	AFC 2
3	PB12V
4	GND
5	VT
6	BU
7	——
8	——
9	DEFEAT

To V-S TUNING PG703 VIA CN703

PG751	
1	GND
2	VIDEO
3	GND
4	AUDIO
5	PB12V
6	A12V
7	——

To JACK(MAIN) PG501 VIA CN501

Q751	
G	0
D	7.8
S	6.9

Q752	
B	0
C	0
E	0

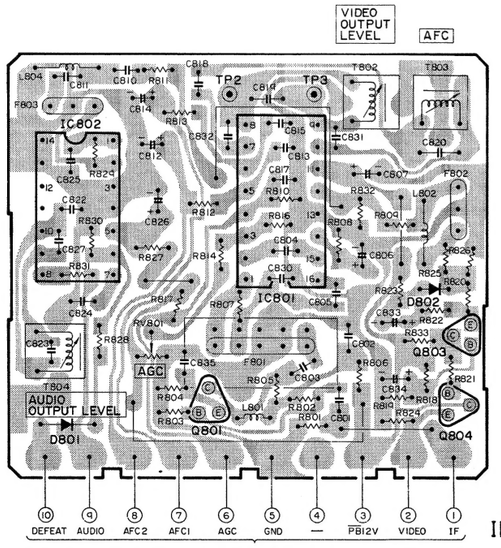
Q753	
B	0.6
C	0
E	0

Q754	
B	8.0
C	11.9
E	7.3

※ VOLTAGE MEASURED IN RECORD MODE.

VHF91 TUNER/IF BOARD (1/2) TYPE 4492

IF PACK PCB



To TUNER/IF P.C.B

IC801			
8	8.0	9	8.0
7	4.3	10	4.3
6	7.7	11	11.9
5	5.9	12	4.9
4	7.0	13	0
3	8.4	14	11.4
2	4.5	15	4.5
1	4.5	16	4.5

IC802			
14	0	1	1.8
13	0	2	1.8
12	0	3	0
11	——	4	0
10	3.7	5	10.9
9	3.7	6	8.3
8	5.3	7	6.3

Q801	
B	1.1
C	7.4
E	0.4

Q803	
B	6.7
C	8.5
E	6.1

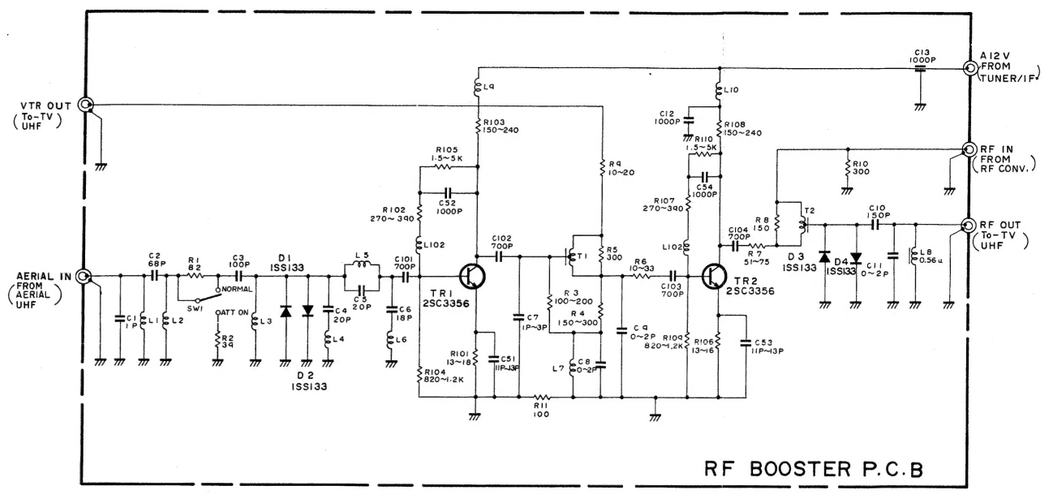
Q804	
B	8.5
C	11.9
E	7.8

※ VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

IF PACK P.C.B

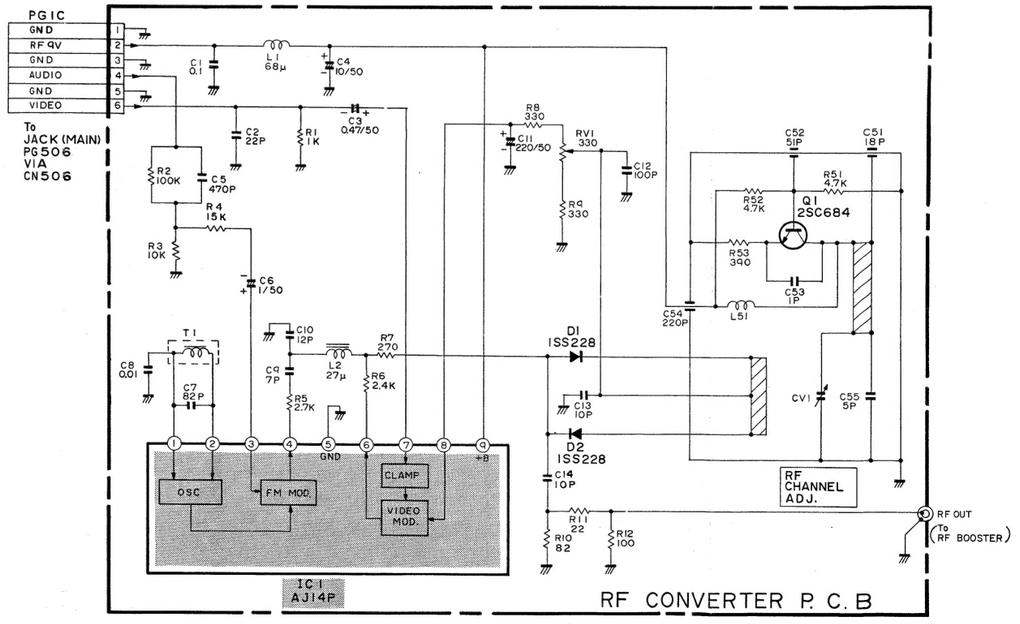
VHS91 IF PACK BOARD (1/2) TYPE 4492

RF BOOSTER PCB



VHS 91 RF BOOSTER SCHEMATIC (TYPE 4492)

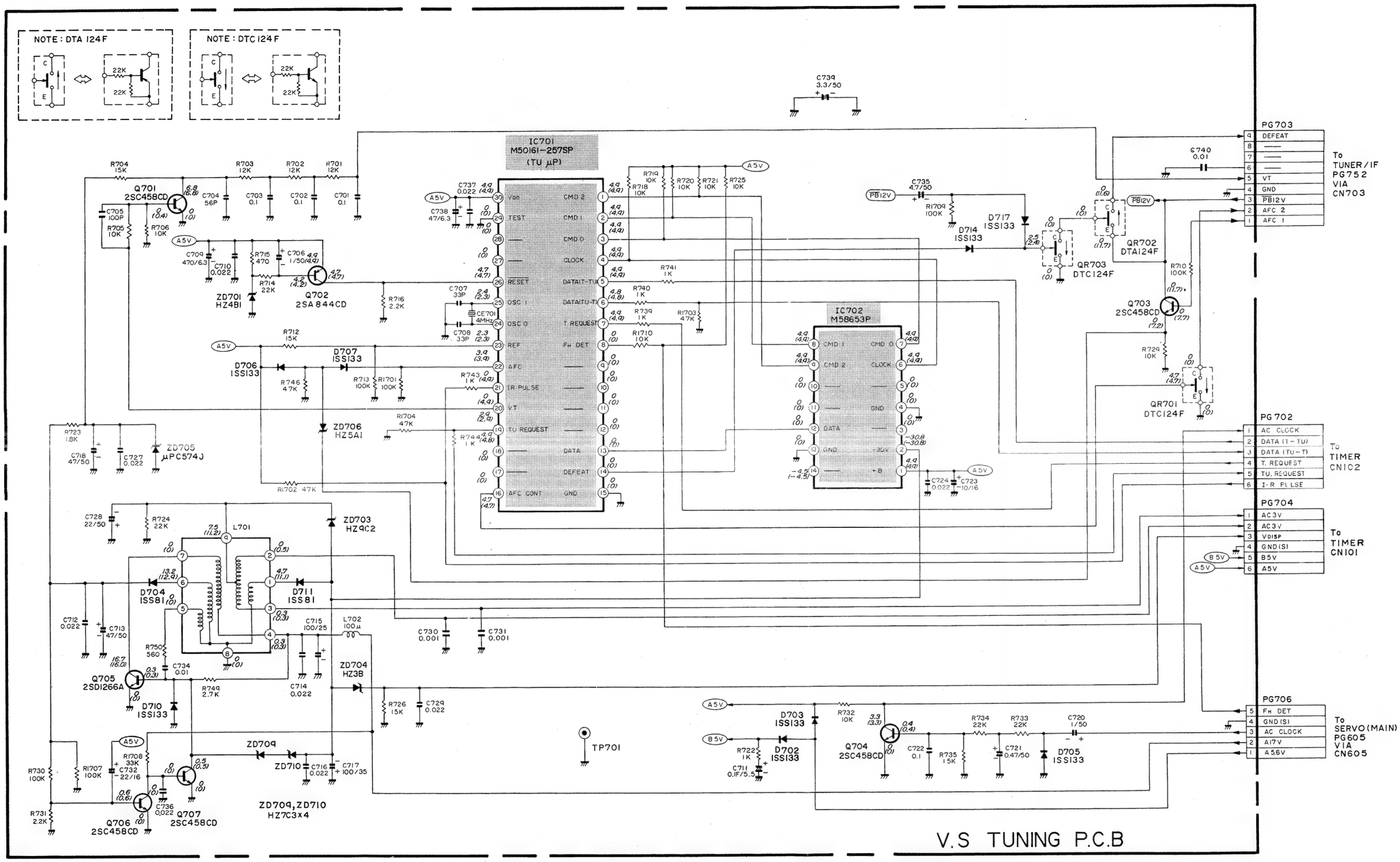
RF CONVERTER FOR UK (BS) TYPE 4492 8004541



VH S1 RF CONVERTER SCHEMATIC (TYPE 4492)

RF Converter 8004541 is a single unit. With failure in this unit we recommend replacing.

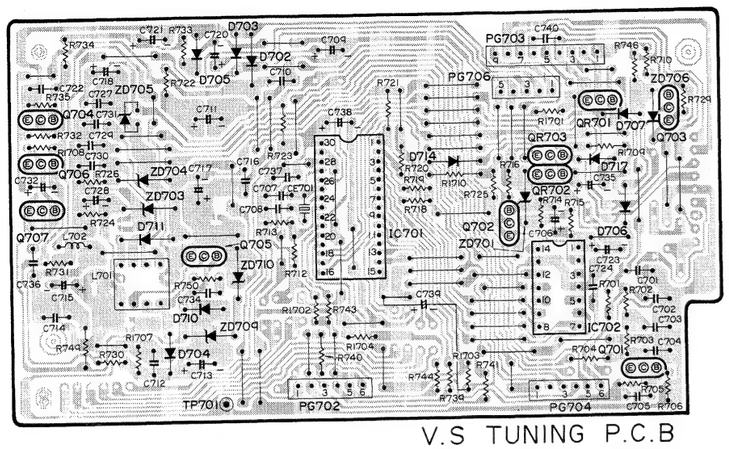
VS TUNING FOR UK (BS) TYPE 4492 8004587



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 V·S TUNING SCHEMATIC (TYPE 4492)

VS TUNING PCB



V.S TUNING P.C.B

PG704

6	A5V
5	B5V
4	GND (S)
3	VDISP
2	AC3V
1	AC3V

To TIMER CN101

PG706

1	A5.6V
2	A17V
3	AC CLOCK
4	GND (S)
5	FM DET

To SERVO(MAIN) PG605 VIA CN605

PG702

6	I R PULSE
5	TU-REQUEST
4	T REQUEST
3	DATA (TU-T)
2	DATA (T-TU)
1	AC CLOCK

To TIMER CN102

PG703

1	AFC 1
2	AFC 2
3	PB12V
4	GND
5	VT
6	—
7	—
8	—
9	DEFEAT

To TUNER/IF PG752 VIA CN703

IC701

30	4.9(4.9)	1	4.9 (4.9)
29	0 (0)	2	4.9 (4.9)
28	0 (0)	3	4.9 (4.9)
27	0 (0)	4	4.9 (4.9)
26	4.7(4.7)	5	4.9(4.9)
25	2.4(2.3)	6	4.8(4.8)
24	2.3(2.3)	7	4.9(4.9)
23	3.9(3.9)	8	0 (0)
22	0 (4.9)	9	0 (0)
21	0 (4.9)	10	0 (0)
20	2.9(2.9)	11	0 (0)
19	4.9(4.8)	12	0 (0)
18	0 (0)	13	0 (0)
17	0 (0)	14	0 (0)
16	4.7(4.7)	15	0 (0)

IC702

14	-4.5(-4.5)	1	4.9 (4.9)
13	0 (0)	2	-30.8(-30.8)
12	0 (0)	3	0 (0)
11	0 (0)	4	0 (0)
10	0 (0)	5	0 (0)
9	4.9(4.9)	6	4.9 (4.9)
8	4.9(4.9)	7	4.9 (4.9)

Q701

B	0 (0.4)
C	6.8 (6.8)
E	0 (0)

Q702

B	4.2 (4.2)
C	4.7 (4.7)
E	4.9 (4.9)

Q703

B	0 (7.7)
C	0 (11.7)
E	0 (7.2)

Q704

B	0.4 (0.4)
C	3.3 (3.3)
E	0 (0)

Q705

B	0.3 (0.3)
C	16.7 (16)
E	0 (0)

Q706

B	0.6 (0.6)
C	0 (0)
E	0 (0)

Q707

B	0 (0)
C	0.5 (0.5)
E	0 (0)

QR701

B	4.7 (4.7)
C	0 (0)
E	0 (0)

QR702

B	0 (0)
C	0 (11.6)
E	0 (11.7)

QR703

B	2.5 (2.4)
C	0 (0)
E	0 (0)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

1-7
1-7
1-7

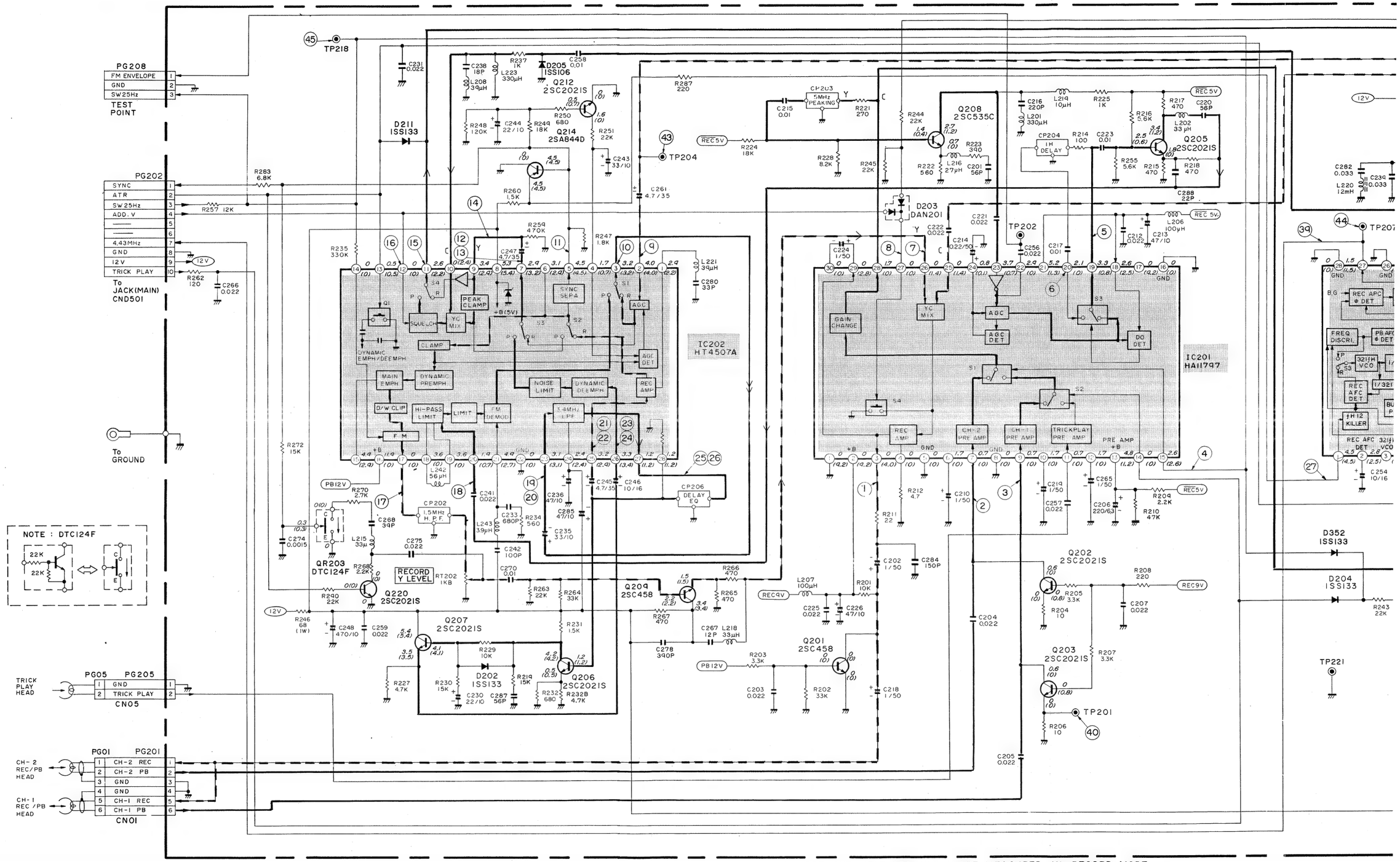
PG706

1	A5.6V
2	A17V
3	AC CLOCK
4	GND (S)
5	FH DET

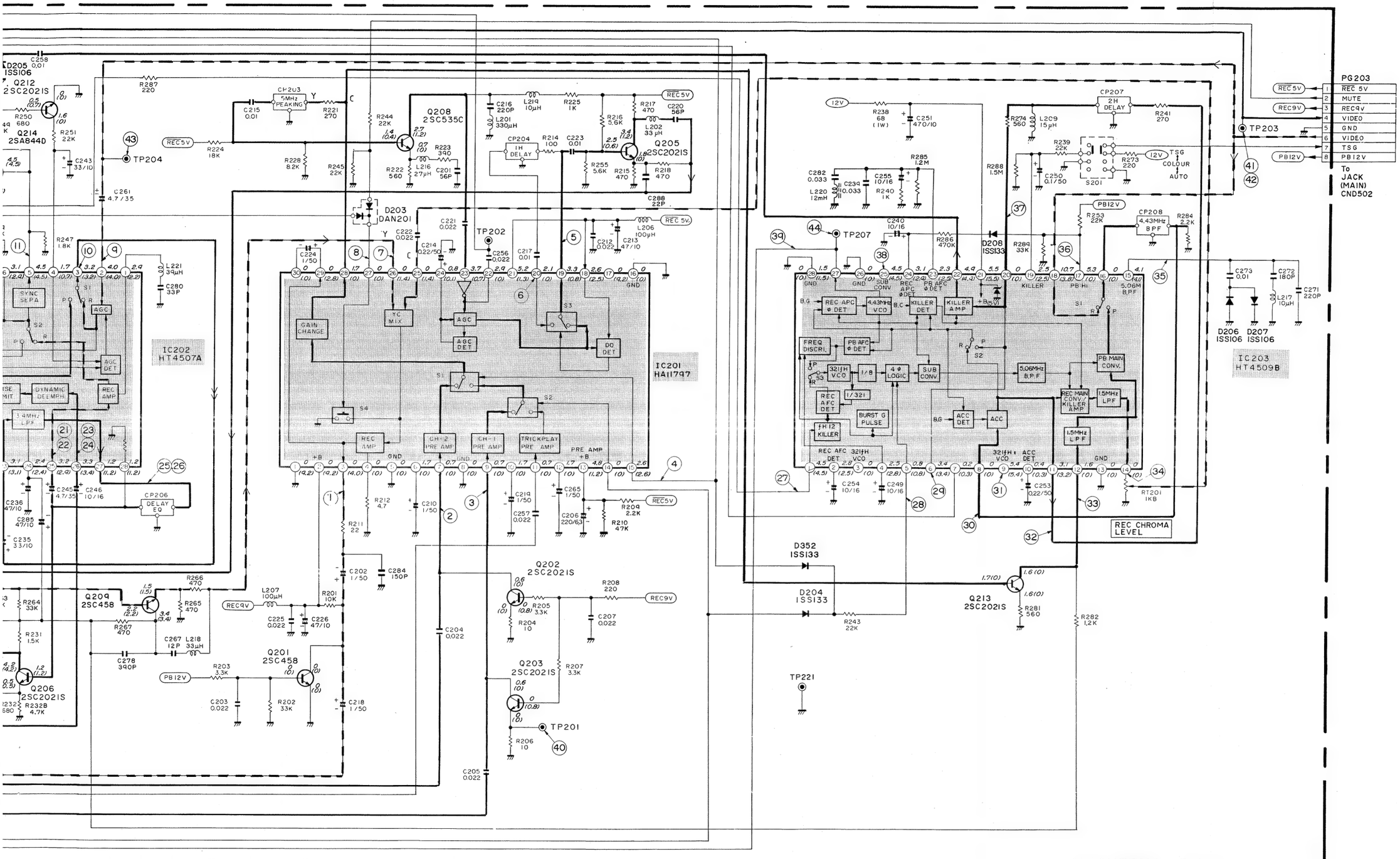
To
SERVO(MAIN)
PG605
VIA
CN605

(TYPE 4492) 1/2

Y-CHROMA WYC FOR UK (BS) TYPE 4492 8004576



Bang&Olufsen



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE

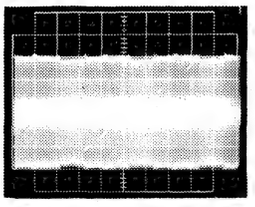
Y/CHROMA P.C.B

VHS 91 Y/CHROMA SCHEMATIC (TYPE 4492)

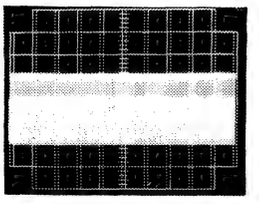
Y/CHROMA CIRCUIT WAVEFORM (TYPE 4492)

[IC201]

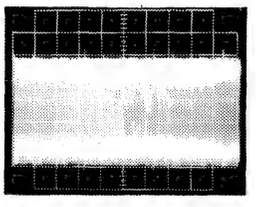
① PIN 3 REC
1V/20μs. div.



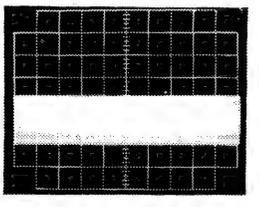
⑥ PIN 20 PB
50mV/0.1ms. div.



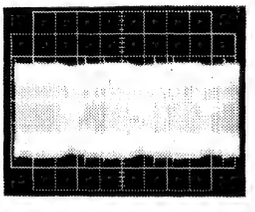
② PIN 7 REC
50mV/20μs. div.



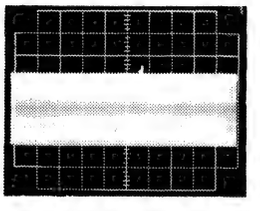
⑦ PIN 26 REC
50mV/0.5ms. div.



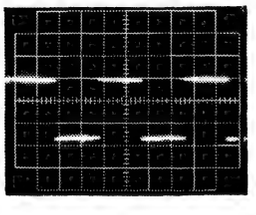
③ PIN 9 REC
50mV/20μs. div.



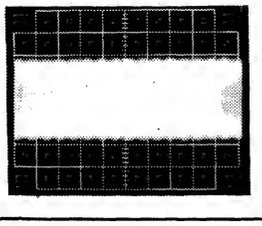
⑧ PIN 27 REC
1V/20μs. div.



④ PIN 15 REC
2V/10ms. div.

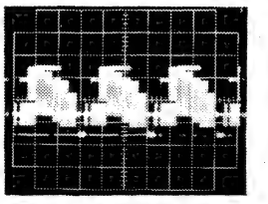


⑤ PIN 19 PB
0.1V/0.1ms. div.

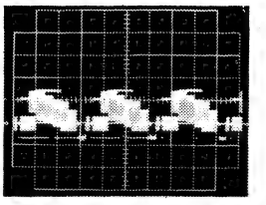


[IC202]

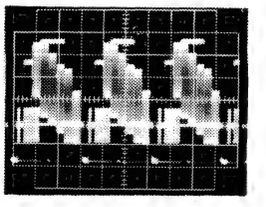
⑨ PIN 2 REC
0.2V/20μs. div.



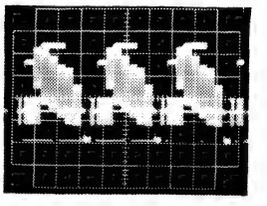
⑭ PIN 9 REC
0.1V/20μs. div.



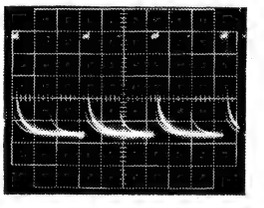
⑩ PIN 3 REC
50mV/20μs. div.



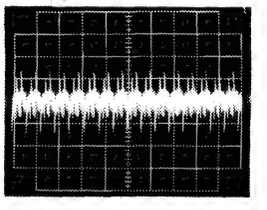
⑮ PIN 11 REC/PB
0.2V/20μs. div.



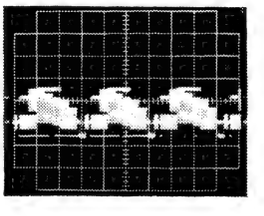
⑪ PIN 5 REC/PB
1V/20μs. div.



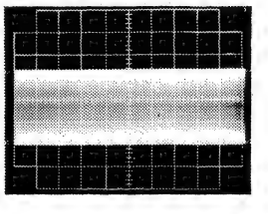
⑯ PIN 12 REC/PB
50mV/0.1ms. div.



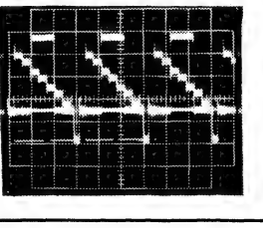
⑫ PIN 7 REC
0.1V/20μs. div.



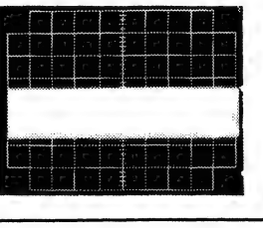
⑰ PIN 17 REC
2V/50μs. div.



⑬ PIN 7 PB
0.2V/20μs. div.

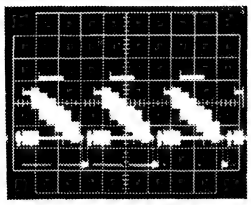


⑱ PIN 20 PB
0.1V/0.1ms. div.

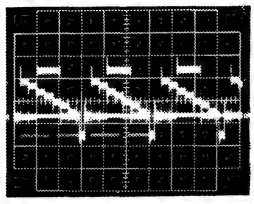


[IC202]

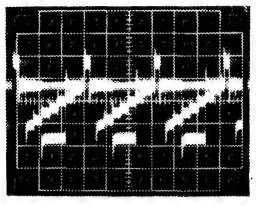
⑲ PIN23 REC
50mV/20μs. div.



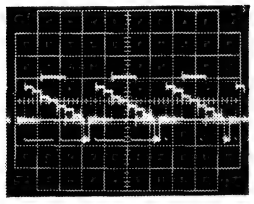
㉔ PIN26 PB
0.1V/20μs. div.



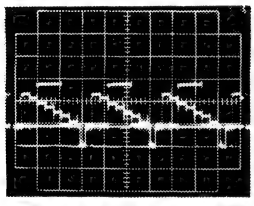
⑳ PIN23 PB
50mV/20μs. div.



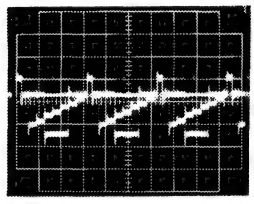
㉕ PIN27 REC
0.1V/20μs. div.



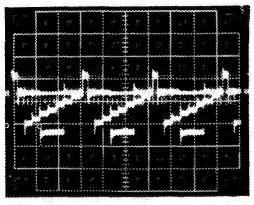
㉑ PIN25 REC
0.1V/20μs. div.



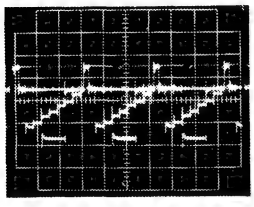
㉖ PIN27 PB
0.1V/20μs. div.



㉒ PIN25 PB
0.1V/20μs. div.

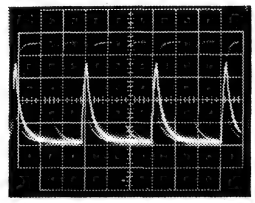


㉓ PIN26 REC
0.1V/20μs. div.

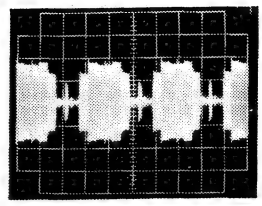


[IC203]

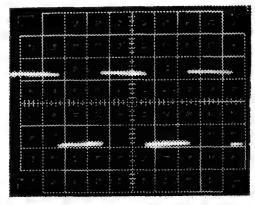
㉗ PIN1 REC/PB
1V/20μs. div.



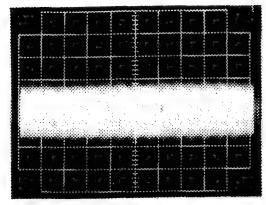
㉜ PIN11 REC
0.2V/20μs. div.



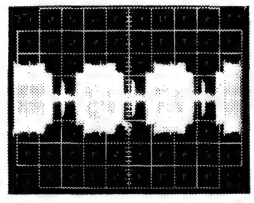
㉘ PIN5 REC/PB
0.5V/10ms. div.



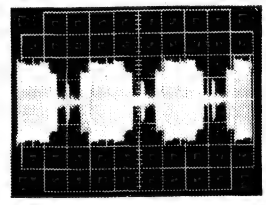
㉝ PIN12 PB
50mV/0.1ms. div.



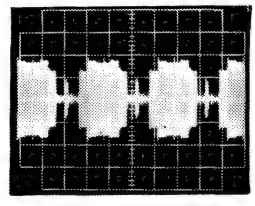
㉙ PIN6 REC/PB
50mV/20μs. div.



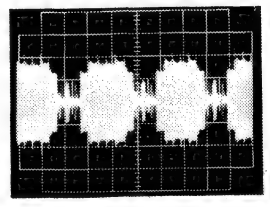
㉞ PIN14 REC
50mV/20μs. div.



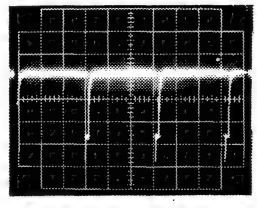
㉚ PIN8 REC
50mV/20μs. div.



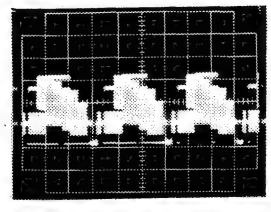
㉟ PIN15 REC/PB
50mV/20μs. div.



㉛ PIN9 REC/PB
0.5V/20μs. div.



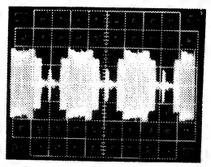
㊱ PIN17 REC
0.2V/20μs. div.



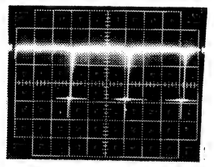
[IC203]

[TEST POINT]

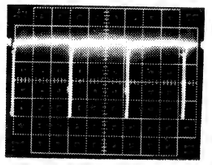
㊲ PIN20 REC/PB
50mV/20μs. div.



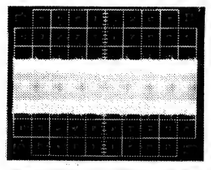
㊳ PIN25 REC
0.1V/0.5ms. div.



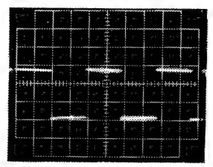
㊴ PIN27 REC
0.1V/0.2ms. div.



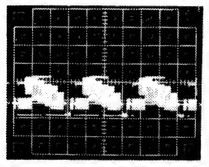
㊵ TP201 REC
50mV/50μs. div.

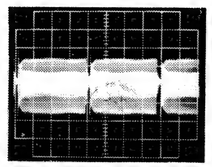


㊺ TP218 REC/PB
2V/10ms. div.

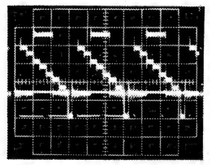


㊶ TP203 REC
0.5V/20μs. div.

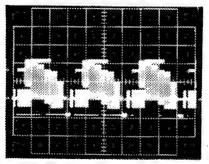




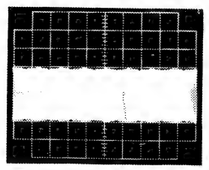
㊷ TP203 PB
0.2V/20μs. div.



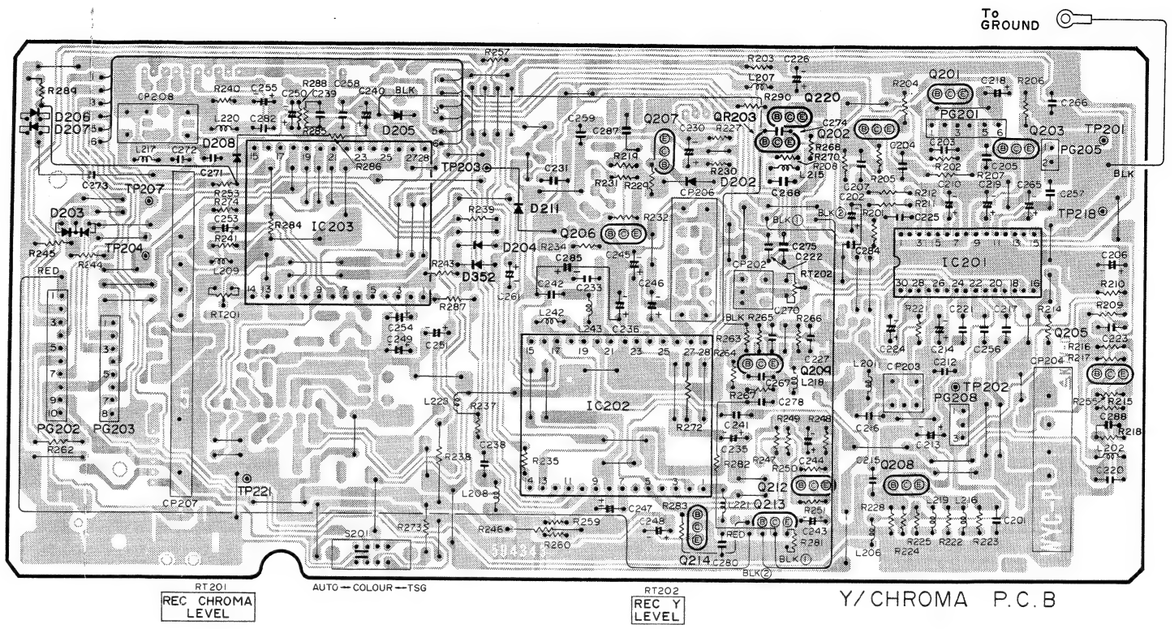
㊸ TP204 REC
0.2V/20μs. div.



㊹ TP207 REC/PB
0.1V/0.1ms. div.



Y-CHROMA PCB



IC201

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0(9.2)	0(9.2)	0(4.0)	0(0)	0(0)	1.7(0)	0.7(0)	0(0)	0.7(0)	1.7(0)	0.7(0)	1.7(0)	4.8(1.2)	0(0)	2.6(2.6)
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
0(0)	0(2.8)	1.7(0)	0(0)	0(1.4)	0(1.4)	0.8(0.1)	3.7(0.7)	2.9(0)	5.2(1.3)	2.1(0)	3.3(0.8)	2.6(2.5)	0(9.2)	0(0)

IC202

15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.9(2.9)	11.9(1.0)	0(0)	3.6(1.0)	3.6(1.0)	1.9(0.7)	4.9(2.7)	0(0)	3.1(3.1)	2.4(2.4)	3.2(2.9)	3.3(3.4)	1.2(1.2)	1.2(1.2)
14	13	12	11	10	9	8	7	6	5	4	3	2	1
0(0)	0.5(0.5)	0(0)	2.6(2.2)	0(2.4)	3.4(2.9)	5.3(5.4)	2.9(3.2)	3.1(2.9)	4.5(4.5)	1.7(0.7)	3.2(3.2)	4.0(4.0)	2.9(2.2)

IC203

15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.1(4.1)	0(0)	5.3(0)	10.7(3.8)	2.5(2.5)	0(0)	5.5(5.5)	4.9(4.9)	2.3(2.5)	3.1(2.9)	4.5(4.5)	0(0)	1.5(1.5)	0(0)
14	13	12	11	10	9	8	7	6	5	4	3	2	1
0(0)	0(0)	1.6(0)	3.1(3.2)	0.4(0.3)	5.4(5.4)	0(0)	0.2(0.3)	3.4(3.4)	0.8(0.8)	2.5(2.8)	0(0)	2.8(2.5)	4.5(4.5)

PG201

1	CH-2 REC
2	CH-2 PB
3	GND
4	GND
5	CH-1 REC
6	CH-1 PB

To VIDEO HEAD PG01 VIA CN01

PG202

1	SYNC
2	ATR
3	SW25Hz
4	ADD. V
5	——
6	——
7	4.43MHz
8	GND
9	12V
10	TRICK PLAY

To JACK (MAIN) CND501

PG203

1	$\overline{\text{REC}}$ 5V
2	MUTE
3	REC 9V
4	VIDEO
5	GND
6	VIDEO
7	TSG
8	PB12V

To JACK (MAIN) CND502

PG205

1	GND
2	TRICK PLAY

To VIDEO HEAD PG05 VIA CN05

PG208

1	FM ENVELOPE
2	GND
3	SW25Hz

TEST POINT

Q201	
B	0(0)
C	0(0)
E	0(0)

Q202	
B	0(0.8)
C	0.6(0)
E	0(0)

Q203	
B	0(0.8)
C	0.6(0)
E	0(0)

Q205	
B	2.5(0.6)
C	3.4(1.2)
E	1.8(0)

Q206	
B	1.2(1.2)
C	4.2(4.2)
E	0.5(0.5)

Q207	
B	4.1(4.1)
C	5.4(5.4)
E	3.5(3.5)

Q208	
B	1.4(0.4)
C	2.7(1.2)
E	0.7(0)

Q209	
B	2.2(2.2)
C	3.4(3.4)
E	1.5(1.5)

Q212	
B	0.5(0.7)
C	1.6(0)
E	0(0)

QR203	
B	0.3(0.3)
C	0(0)
E	0(0)

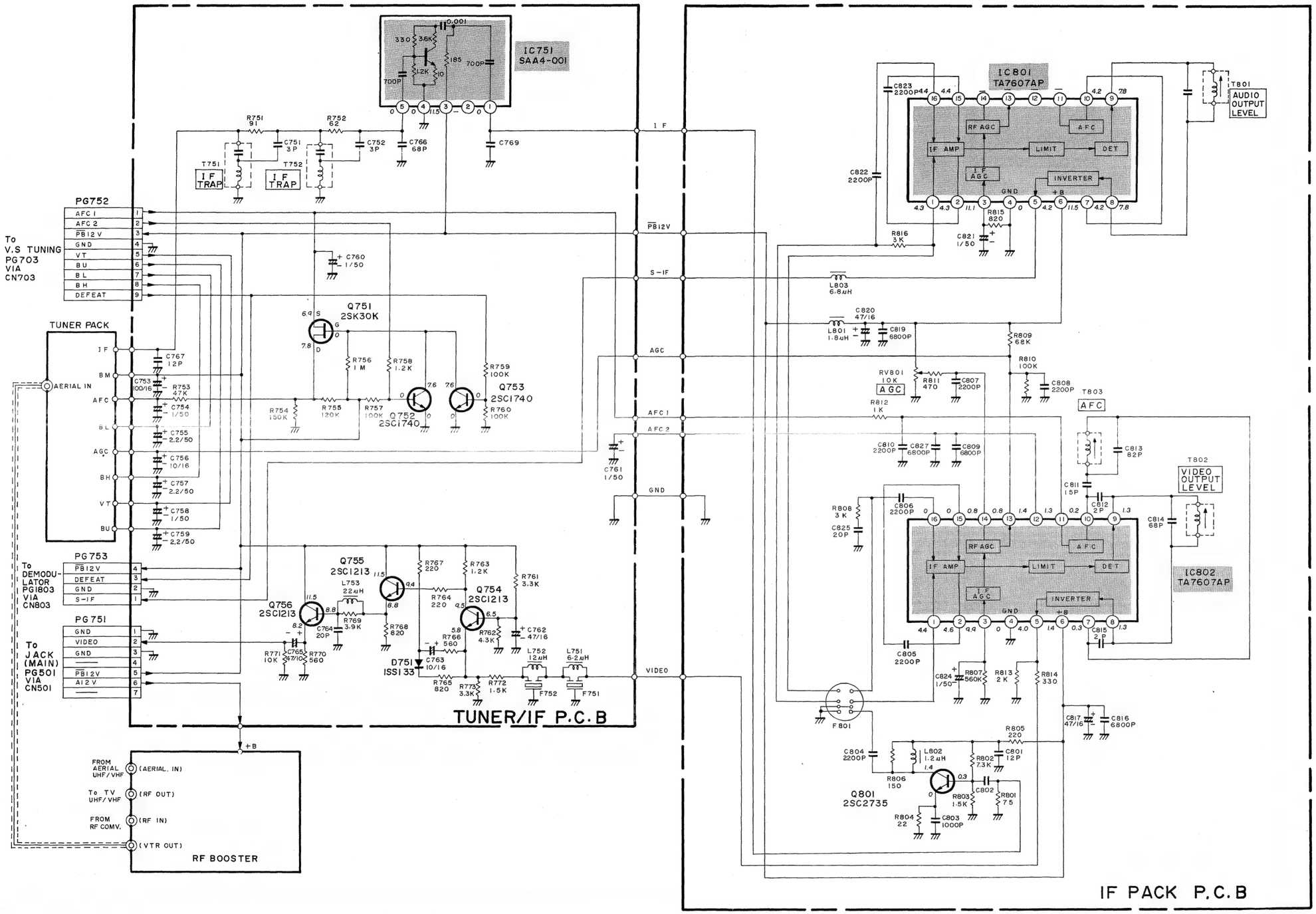
Q213	
B	1.7 (C)
C	1.6 (C)
E	1.6 (C)

Q214	
B	4.5(4.5)
C	0 (C)
E	4.5 (4.5)

Q220	
B	0(0)
C	0(0)
E	0(0)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN( ) ARE MEASURED IN RECORD MODE.

TUNER IF BLOCK FOR ALL BAND TUNER (CT) TYPE 4493 8004595



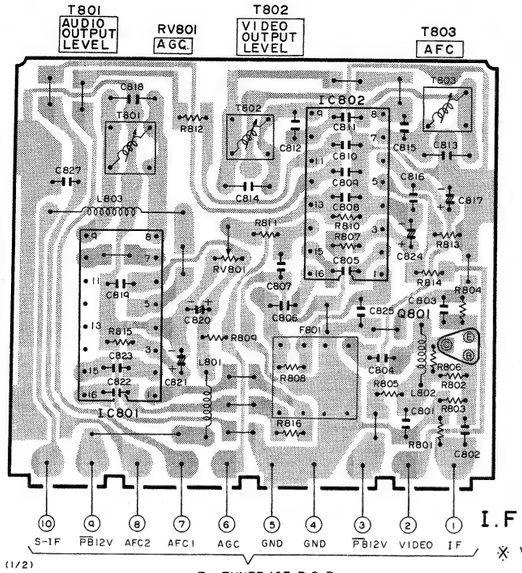
The Tuner IF Block 8004595 is a single unit, and consists of VHF/UHF Tuner, IF and RF Booster. With failure in this blok we recommend replacing.

※ VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

VHS 91 TUNER/IF SCHEMATIC (TYPE 4493)

1-13

IF PCB



IC801			
9	7.8	8	7.8
10	4.2	7	4.2
11	—	6	11.5
12	—	5	4.2
13	—	4	0
14	—	3	11.1
15	4.4	2	4.3
16	4.4	1	4.3

IC802			
9	1.3	8	1.3
10	0.2	7	0.3
11	1.3	6	1.4
12	1.4	5	4.0
13	0.8	4	0
14	0.8	3	9.9
15	0	2	4.6
16	0	1	4.4

Q801	
B	0.3
C	1.4
E	0

I.F PACK P.C.B

※ VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

VHS91. IF PACK. TYPE 4493 BOARD (1/2)

TUNER IF

PG751	
1	GND
2	VIDEO
3	GND
4	——
5	PB12V
6	AI2V
7	——

To JACK (MAIN) PG501 VIA CN501

PG752	
1	AFC 1
2	AFC 2
3	PB12V
4	GND
5	VT
6	BU
7	BL
8	BH
9	DEFEAT

To V.S TUNING PG703 VIA CN703

PG753	
1	S-IF
2	GND
3	DEFEAT
4	PB12V

To DEMODULATOR PG1803 VIA CN1803

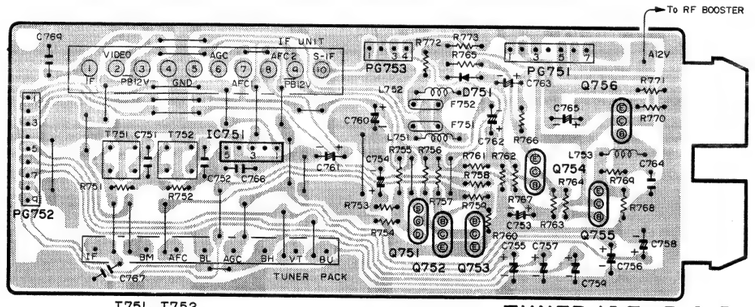
Q751		Q752	
D	7.8	B	0
G	0	C	7.6
S	6.9	E	0

Q754		Q755	
B	6.5	B	9.4
C	9.5	C	11.5
E	5.8	E	8.8

Q753	
B	0
C	7.6
E	0

Q756	
B	8.8
C	11.5
E	8.2

IC751				
1	2	3	4	5
0	—	11.5	0	0

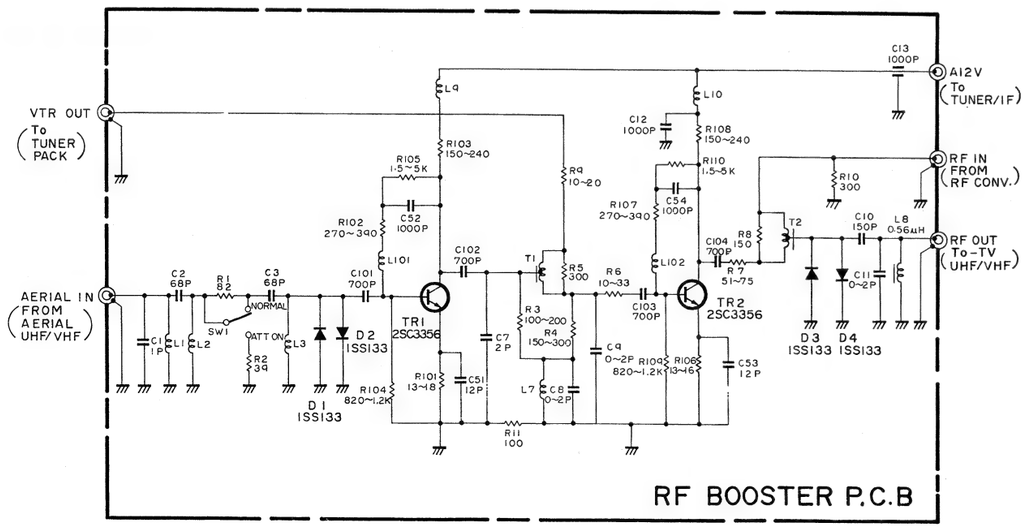


TUNER/IF P.C.B

VHS91 TUNER/IF BOARD (1/2) TYPE4493

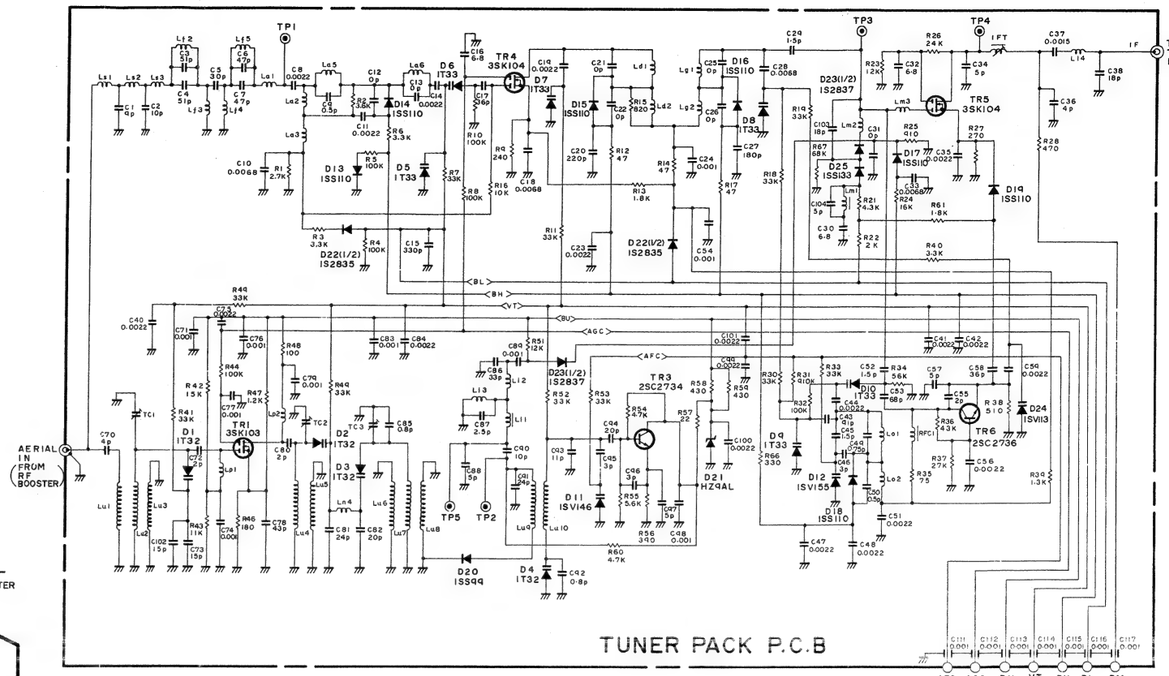
※ VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

RF BOOSTER



RF BOOSTER P.C.B

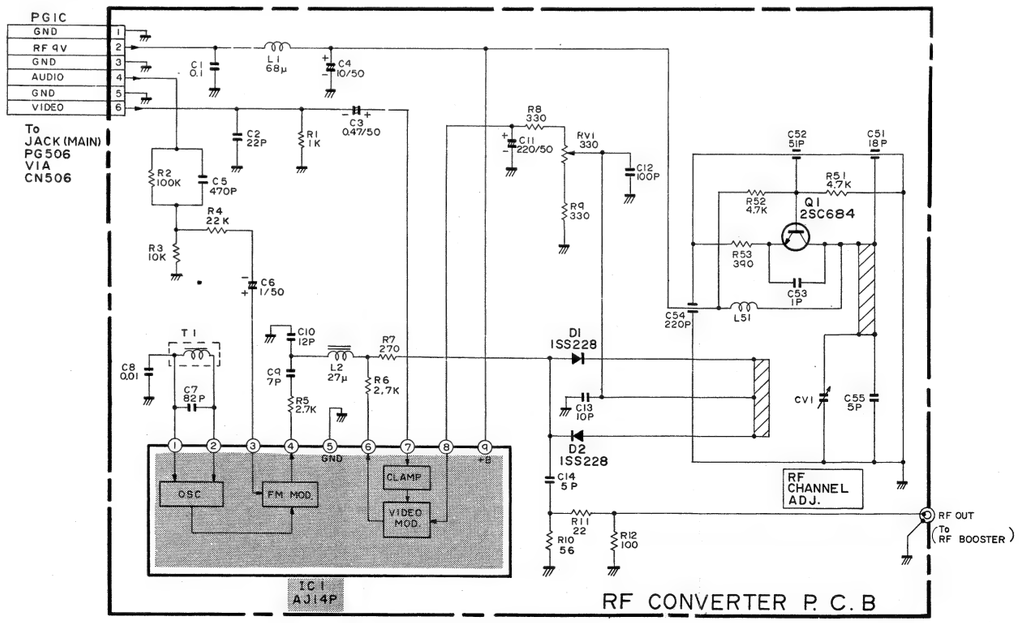
TUNER



TUNER PACK P.C.B

VHS91 TUNER PACK SCHEMATIC (TYPE 4493)

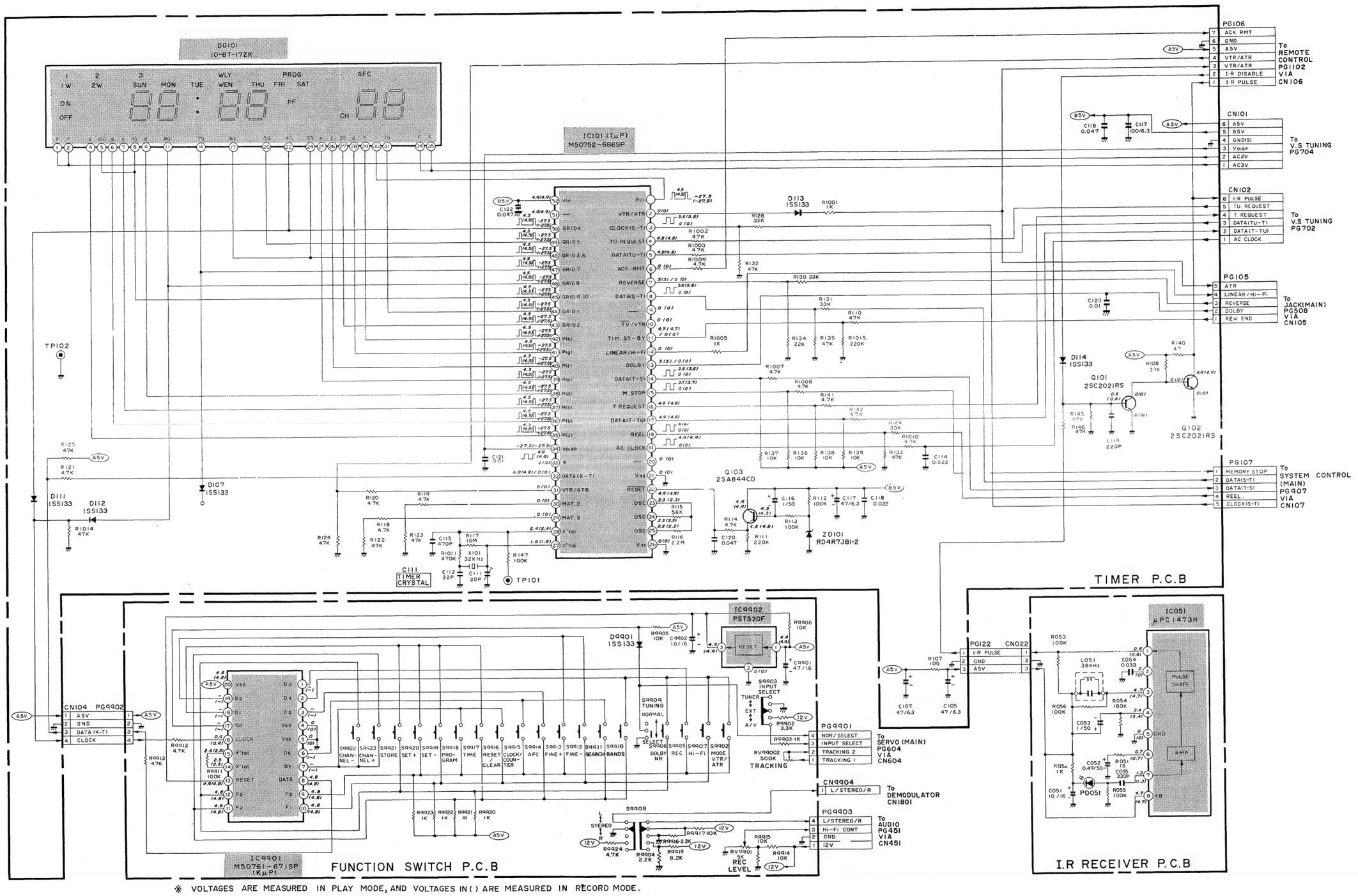
RF CONVERTER FOR TYPE 4493 (CT) 8004542



RF CONVERTER P.C.B

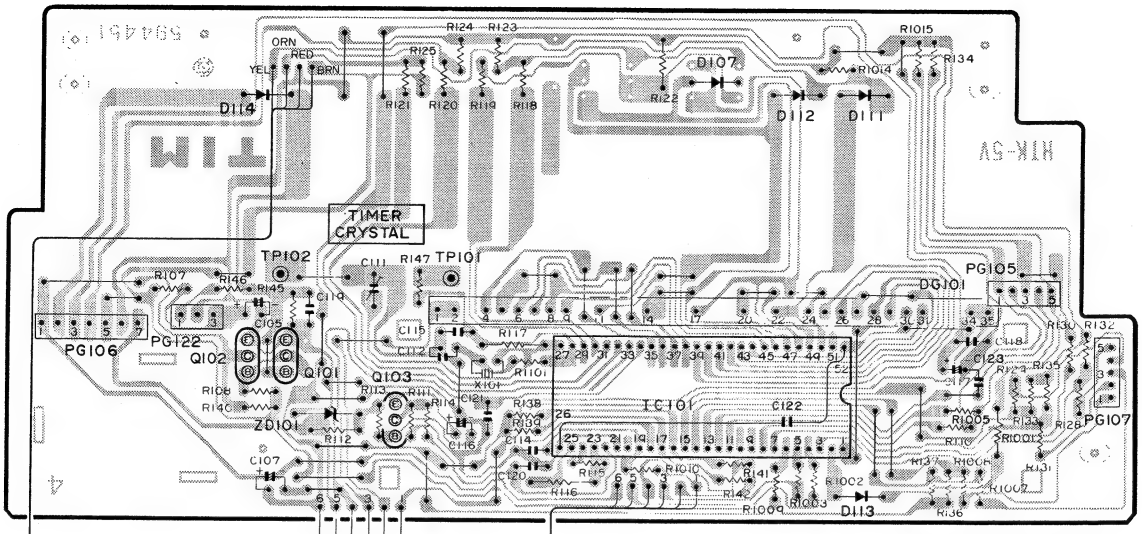
VHS91 RF CONVERTER SCHEMATIC (TYPE 4493)

TIMER TIM FOR TYPE 4493 (CT) 8004586



VHS91 TIMER / FUNCTION SWITCH SCHEMATIC (TYPE 4493)

TIMER PCB



VHS 91 TIMER BOARD (TYPE 4493) 1/2

CN104

BRN	1	A5V
RED	2	GND
ORN	3	DATA (K-T)
YEL	4	CLOCK

To FUNCTION SWITCH PG9902

CN101

1	AC3V
2	AC3V
3	VDISP
4	GND (S)
5	B5V
6	A5V

To V-S TUNING PG704

CN102

1	AC CLOCK
2	DATA (T-TU)
3	DATA (TU-T)
4	T-REQUEST
5	TU-REQUEST
6	I-R PULSE

To V-S TUNING PG702

PG105

1	REW END
2	DOLBY
3	REVERSE
4	LINEAR/Hi-Fi
5	ATR

To JACK (MAIN) PG508 VIA CN105

PG106

1	I-R PULSE
2	I-R DISABLE
3	VTR/ATR
4	VTR/ATR
5	A5V
6	GND
7	ACK RMT

To REMOTE CONTROL PG1102 VIA CN106

PG107

1	MEMORY STOP
2	DATA (S-T)
3	DATA (T-S)
4	REEL
5	CLOCK (S-T)

To SYSTEM CONTROL (MAIN) PG 907 VIA CN107

PG122

1	I-R PULSE
2	GND
3	A5V

To I-R RECEIVER CN022

B	0.6(0.6)
C	0(0)
E	0(0)

Q101

B	0(0)
C	4.9(4.9)
E	0(0)

Q102

B	4.3(4.3)
C	4.8(4.8)
E	4.9(4.9)

Q103

IC101

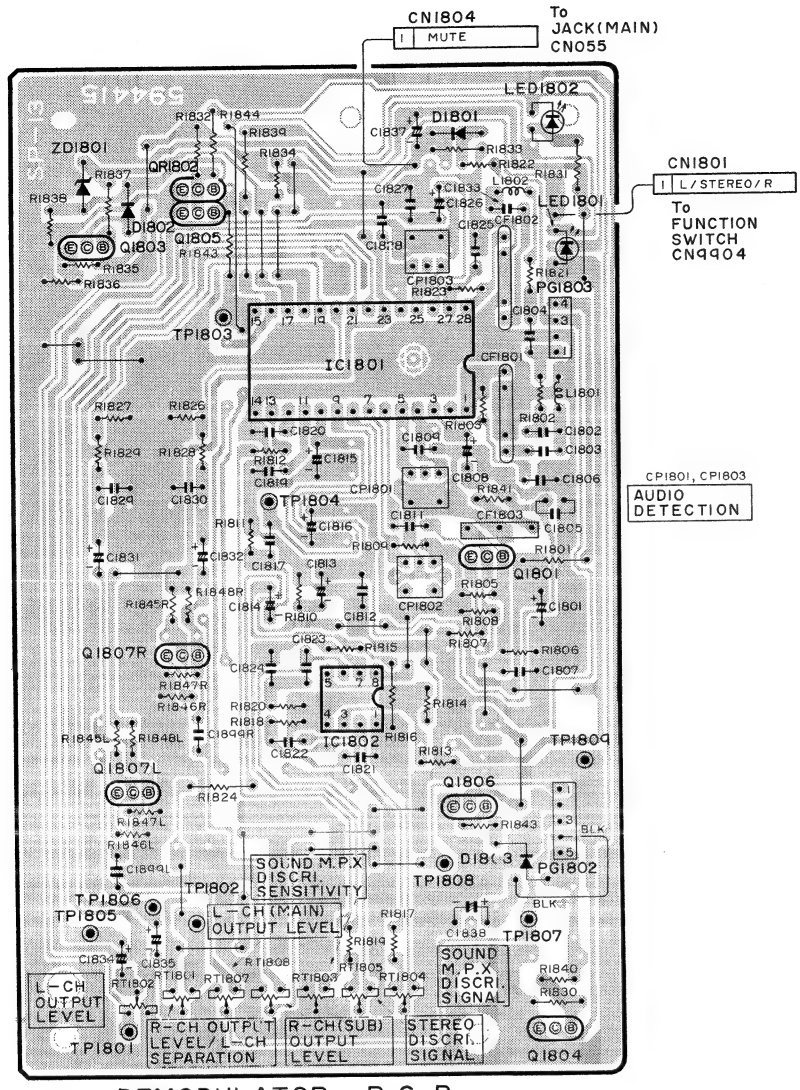
52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32
4.9(4.9)	4.9(4.9)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-(-)	-2.75(-2.75)	-(-)	-(-)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
-(-)	0(0)	-(-)	4.8(4.8)	4.8(4.8)	0(0)	-(-)	-(-)	0(0)	0 (0)	-(-)	0(0)	-(-)	-(-)	-(-)	4.9(4.9)	4.9(4.9)	-(-)	-(-)	0(0)	0(0)

31	30	29	28	27
0(0)	0(0)	0(0)	2.4(2.4)	1.6(1.6)
22	23	24	25	26
4.9(4.9)	2.3(2.3)	2.3(2.3)	2.2(2.2)	0(0)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN( ) ARE MEASURED IN RECORD MODE

Bang&Olufsen

DEMODULATOR PCB



DEMODULATOR P.C.B

IC1801

15	16	17	18	19	20	21	22	23	24	25	26	27	28
0 (10.2)	0 (18.7)	0 (7.2)	0 (0)	0 (6.9)	0 (7.0)	0.2 (2.2)	0.2 (2.2)	0 (10.8)	0 (2.9)	0 (2.9)	0.3 (6.7)	0 (1.8)	0 (1.8)
14	13	12	11	10	9	8	7	6	5	4	3	2	1
0 (0)	0 (5.7)	0 (6.3)	0 (5.4)	0 (6.3)	0 (1.4)	0 (5.0)	0 (10.8)	0 (1.4)	0 (2.8)	0 (2.8)	0.3 (6.1)	0 (1.7)	0 (1.7)

IC1802

5	6	7	8
0 (2.5)	0.2 (2.5)	0 (2.5)	0 (10.8)
4	3	2	1
0 (0)	0 (2.5)	0.3 (2.5)	0.4 (2.5)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN( ) ARE MEASURED IN RECORD MODE.

QR1802

B	0 (0)
C	0 (0)
E	0 (0)

Q1801

B	0 (0)
C	0 (0.4)
E	0 (0)

Q1803

B	0 (7.2)
C	0 (0)
E	0 (5.5)

Q1804

B	0 (0.6)
C	0 (0)
E	0 (0)

Q1805

B	0 (0.6)
C	0 (0.6)
E	0 (0)

Q1806

B	0.3 (0.6)
C	0 (0)
E	0 (0)

PG1802

1	CH-2 (R)
2	GND
3	CH-1 (L)
4	DUAL (L+R)
5	TUNER

To JACK (MAIN) PG502 VIA CN502

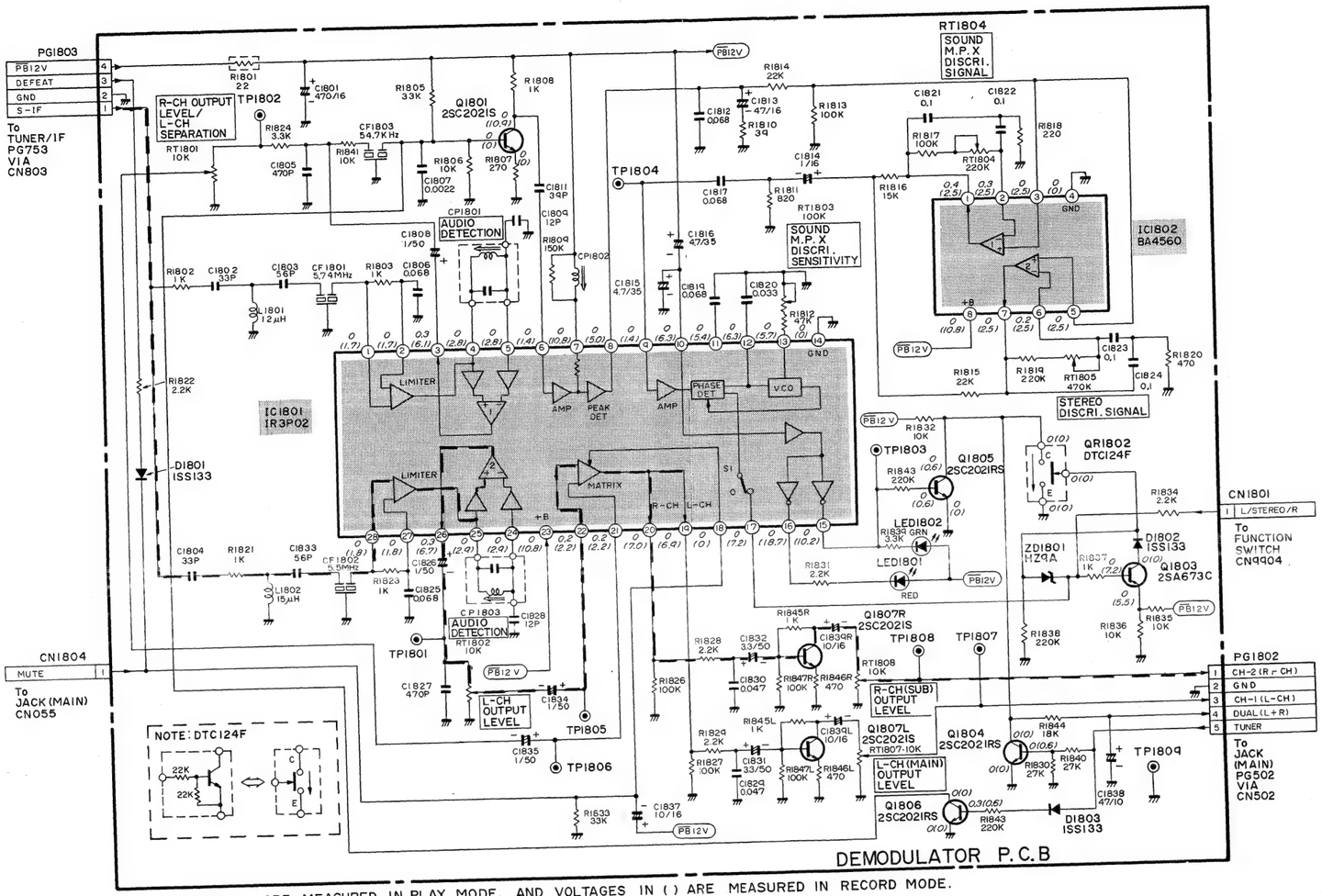
PG1803

4	$\overline{PB}$12V
3	DEFEAT
2	GND
1	S-IF

To TUNER / IF PG753 VIA CN803

VHS91 DEMODULATOR BOARD (TYPE 4493) 1/2

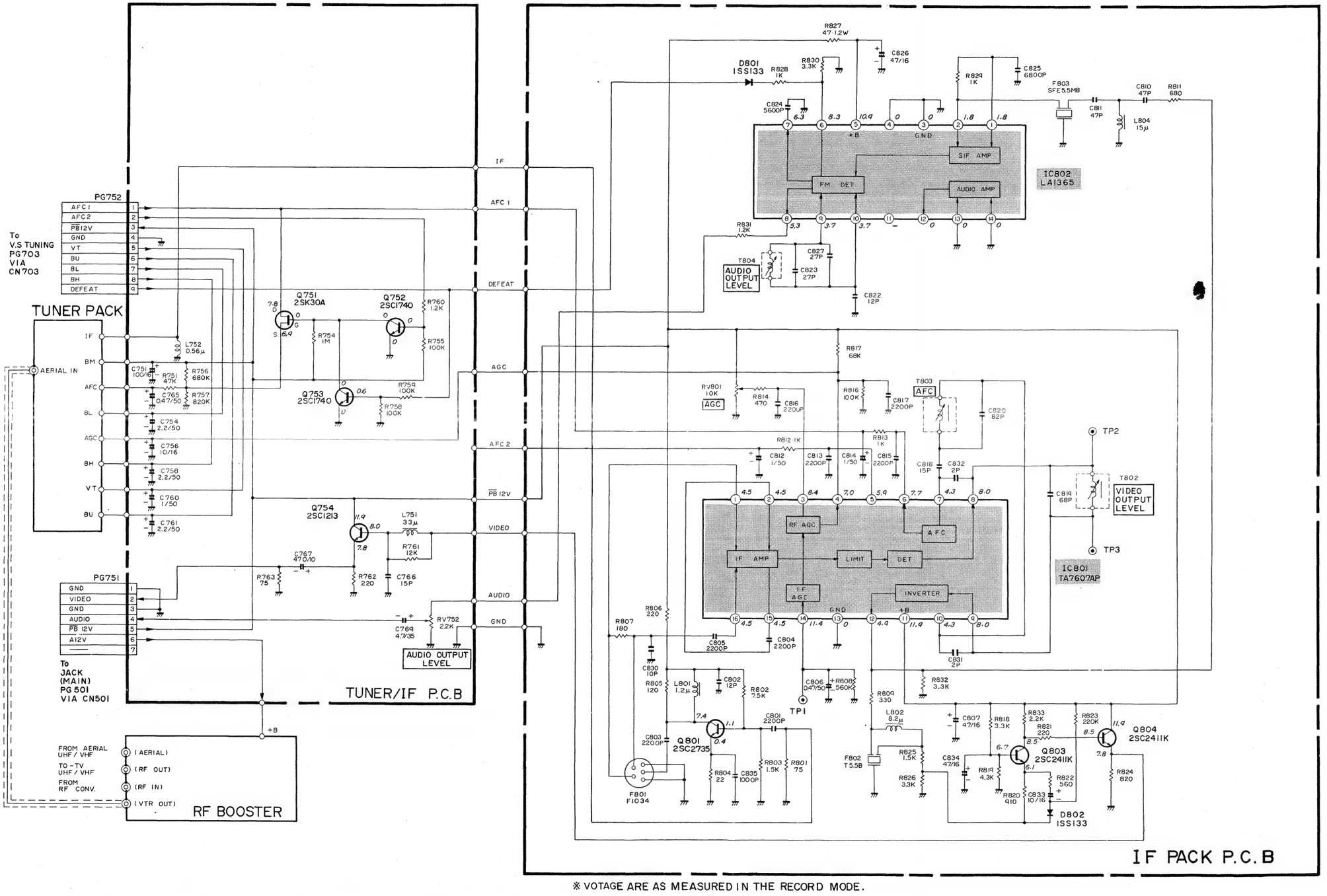
DEMODULATOR FOR TYPE 4493 (CT) 8004581



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 DEMODULATOR SCHEMATIC (TYPE4493)

TUNER IF FOR TYPE 4491 (H) 8004540



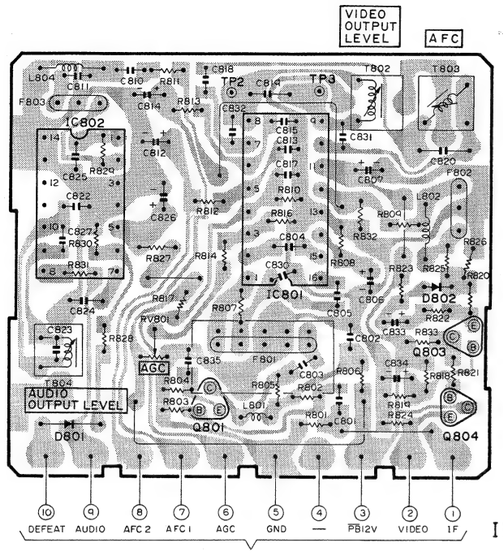
※ VOTAGE ARE AS MEASURED IN THE RECORD MODE.

VHS 91 TUNER/IF SCHEMATIC (TYPE 4491)

The Tuner IF Block 8004540 is a single unit and consists of VHF/UHF Tuner, IF and RF Booster.
With failure in this block we recommend replacing.

1-19

IF PCB



To TUNER/IF P.C.B

IC801

8	8.0	9	8.0
7	4.3	10	4.3
6	7.7	11	11.9
5	5.9	12	4.9
4	7.0	13	0
3	8.4	14	11.4
2	4.5	15	4.5
1	4.5	16	4.5

IC802

14	0	1	1.8
13	0	2	1.8
12	0	3	0
11	—	4	0
10	3.7	5	10.9
9	3.7	6	8.3
8	5.3	7	6.3

Q801

B	1.1
C	7.4
E	0.4

Q803

B	6.7
C	8.5
E	6.1

Q804

B	8.5
C	11.9
E	7.8

※ VOLTAGE ARE AS MEASURED IN THE RECORD MODE.

IF PACK P.C.B

VHS-91 IF-PACK BOARD (1/2) TYPE4491

TUNER IF PCB

PG752

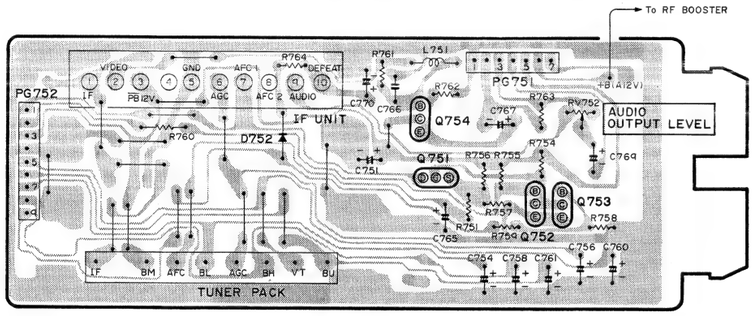
1	AFC 1
2	AFC 2
3	PB12V
4	GND
5	VT
6	BU
7	BL
8	BH
9	DEFEAT

To V,S TUNING PG703 VIA CN703

PG751

1	GND
2	VIDEO
3	GND
4	AUDIO
5	PB12V
6	A12V
7	—

To JACK (MAIN) PG501 VIA CN501



Q751

D	7.8
G	0
S	6.9

Q752

B	0
C	0
E	0

Q753

B	0.6
C	0
E	0

Q754

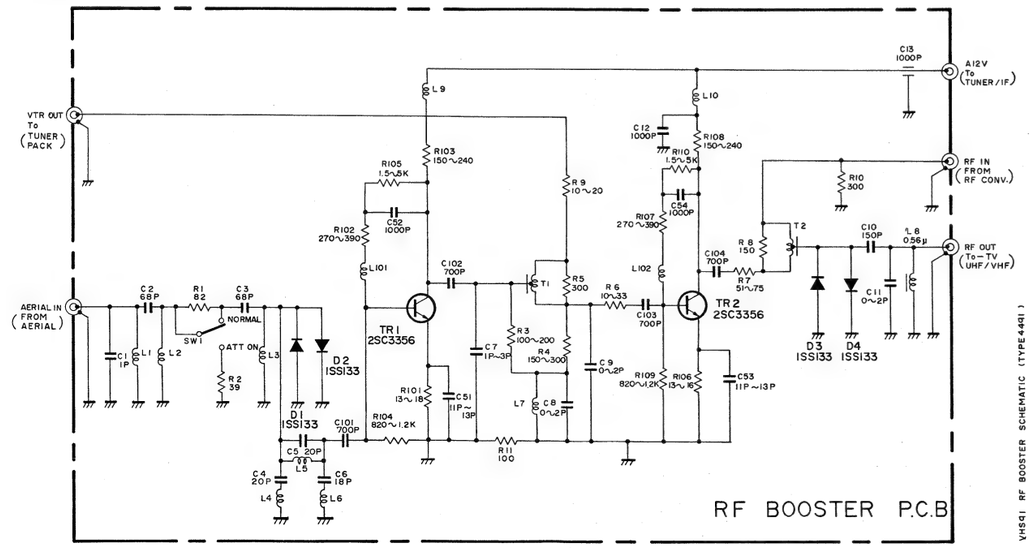
B	8.0
C	11.9
E	7.8

※ VOTAGE ARE AS MEAURED IN THE RECORD MODE.

TUNER/IF P.C.B

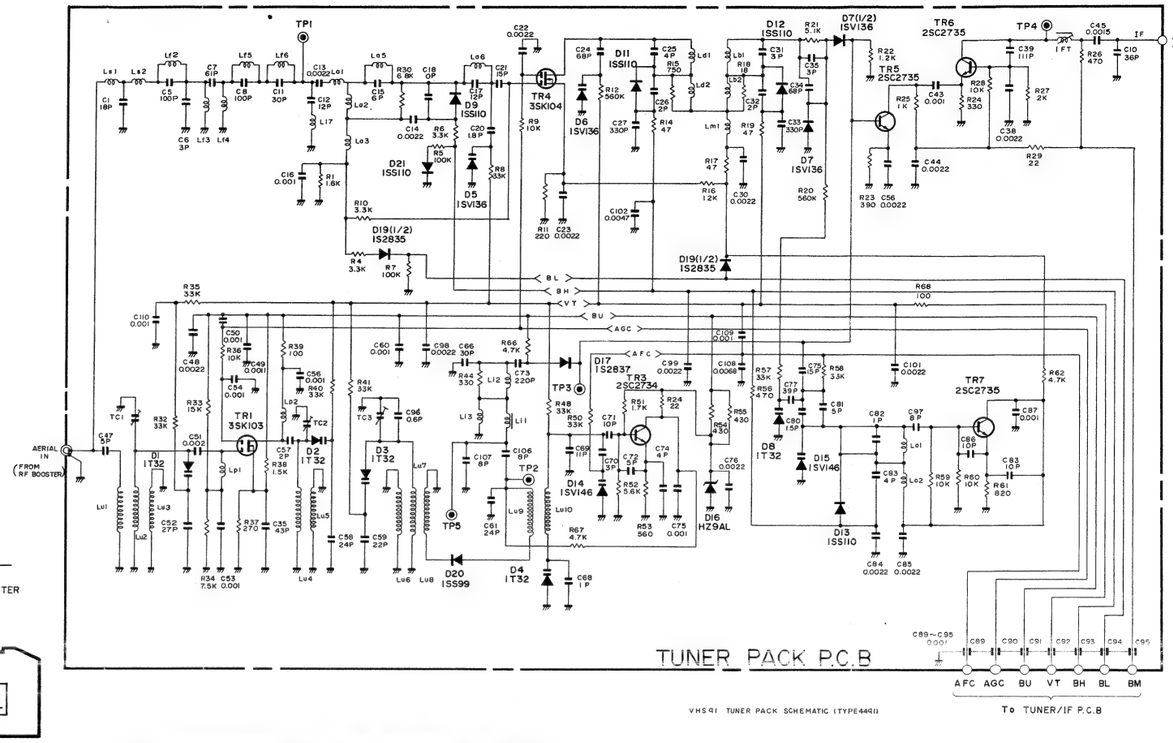
VHS91 TUNER/IF BOARD (1/2) TYPE 4491

RF BOOSTER



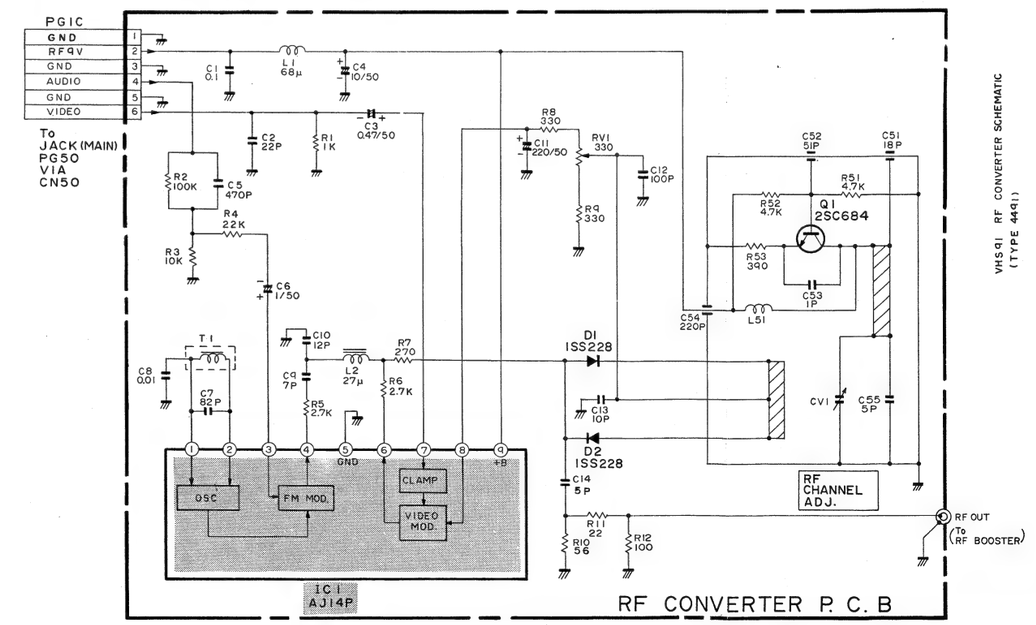
VHS91 RF BOOSTER SCHEMATIC (TYPE4491)

TUNER



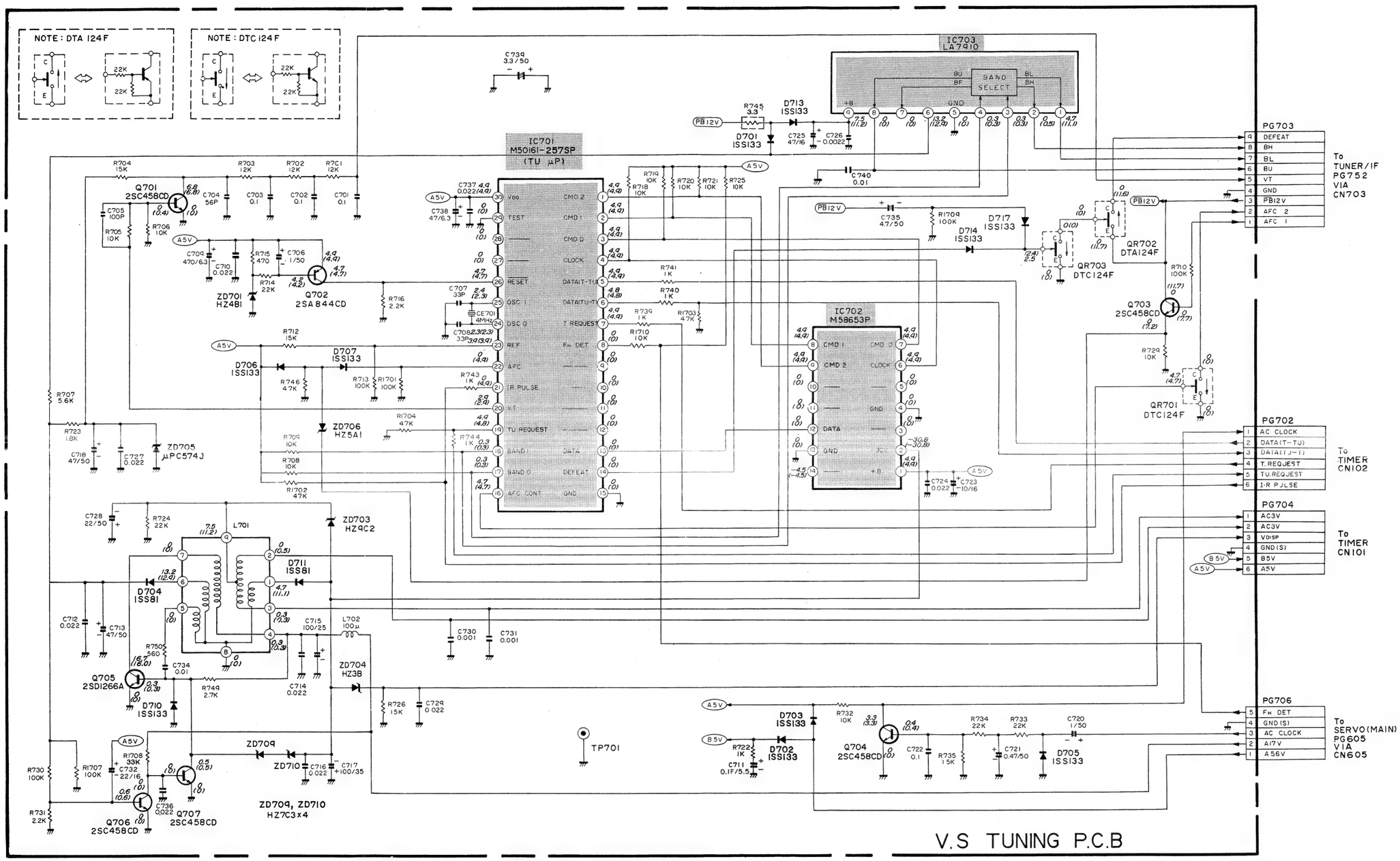
VHS91 TUNER PACK SCHEMATIC (TYPE4491)

RF CONVERTER FOR TYPE 4491 (H) 8004542



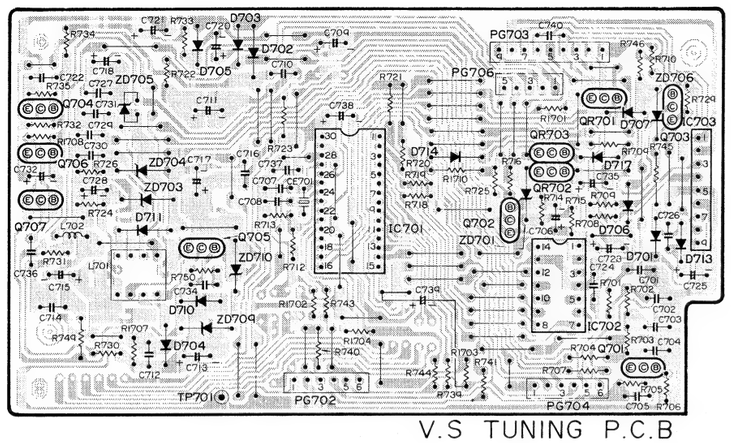
RF Converter 8004542 is a single unit. With failure in this unit we recommend replaicing.

VS TUNING FOR TYPE 4491 (H) AND TYPE 4493 (CT) 8004588



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN( ) ARE MEASURED IN RECORD MODE.

VS TUNING PCB



V.S TUNING P.C.B

PG704

6	A5V
5	B5V
4	GND (S)
3	VDISP
2	AC3V
1	AC3V

To
TIMER
CN101

PG706

1	A5.6V
2	A17V
3	AC CLOCK
4	GND (S)
5	FH DET

To
SERVO (MAIN)
PG605
VIA
CN605

PG702

6	I R PULSE
5	IU REQUEST
4	T REQUEST
3	DATA (TU T)
2	DATA (T TU)
1	AC CLOCK

To
TIMER
CN102

PG703

1	AFC 1
2	AFC 2
3	PB12V
4	GND
5	VT
6	BU
7	BL
8	BH
9	DEFEAT

To
TUNER/IF
PG752
VIA
CN703

IC701

30	4.9(4.9)	1	4.9(4.9)
29	0(0)	2	4.9(4.9)
28	0(0)	3	4.9(4.9)
27	0(0)	4	4.9(4.9)
26	4.7(4.7)	5	4.9(4.9)
25	2.4(2.3)	6	4.8(4.8)
24	2.3(2.3)	7	4.9(4.9)
23	3.9(3.9)	8	0(0)
22	0(4.9)	9	0(0)
21	0(4.9)	10	0(0)
20	2.9(2.9)	11	0(0)
19	4.9(4.8)	12	0(0)
18	0.3(0.3)	13	0(0)
17	0.3(0.3)	14	0(0)
16	4.7(4.7)	15	0(0)

IC702

14	4.5(4.5)	1	4.9(4.9)
13	0(0)	2	30.8(30.8)
12	0(0)	3	0(0)
11	0(0)	4	0(0)
10	0(0)	5	0(0)
9	4.9(4.9)	6	4.9(4.9)
8	4.9(4.9)	7	4.9(4.9)

IC703

1	4.7(11.1)
2	0(10.5)
3	0.3(0.3)
4	0.3(0.3)
5	0(0)
6	13.2(12.9)
7	0(0)
8	0(0)
9	7.5(11.2)

Q701

B	0(0.4)
C	6.8(6.8)
E	0(0)

Q702

B	4.2(4.2)
C	4.7(4.7)
E	4.9(4.9)

Q703

B	0(7.7)
C	0(11.7)
E	0(7.2)

Q704

B	0.4(0.4)
C	3.3(3.3)
E	0(0)

Q705

B	0.3(0.3)
C	16.7(16)
E	0(0)

Q706

B	0.6(0.6)
C	0(0)
E	0(0)

Q707

B	0(0)
C	0.5(0.5)
E	0(0)

QR701

B	4.7(4.7)
C	0(0)
E	0(0)

QR702

B	0(0)
C	0(11.6)
E	0(11.7)

QR703

B	2.5(2.4)
C	0(0)
E	0(0)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

1-21
1-21
1-21
1-21

PG706

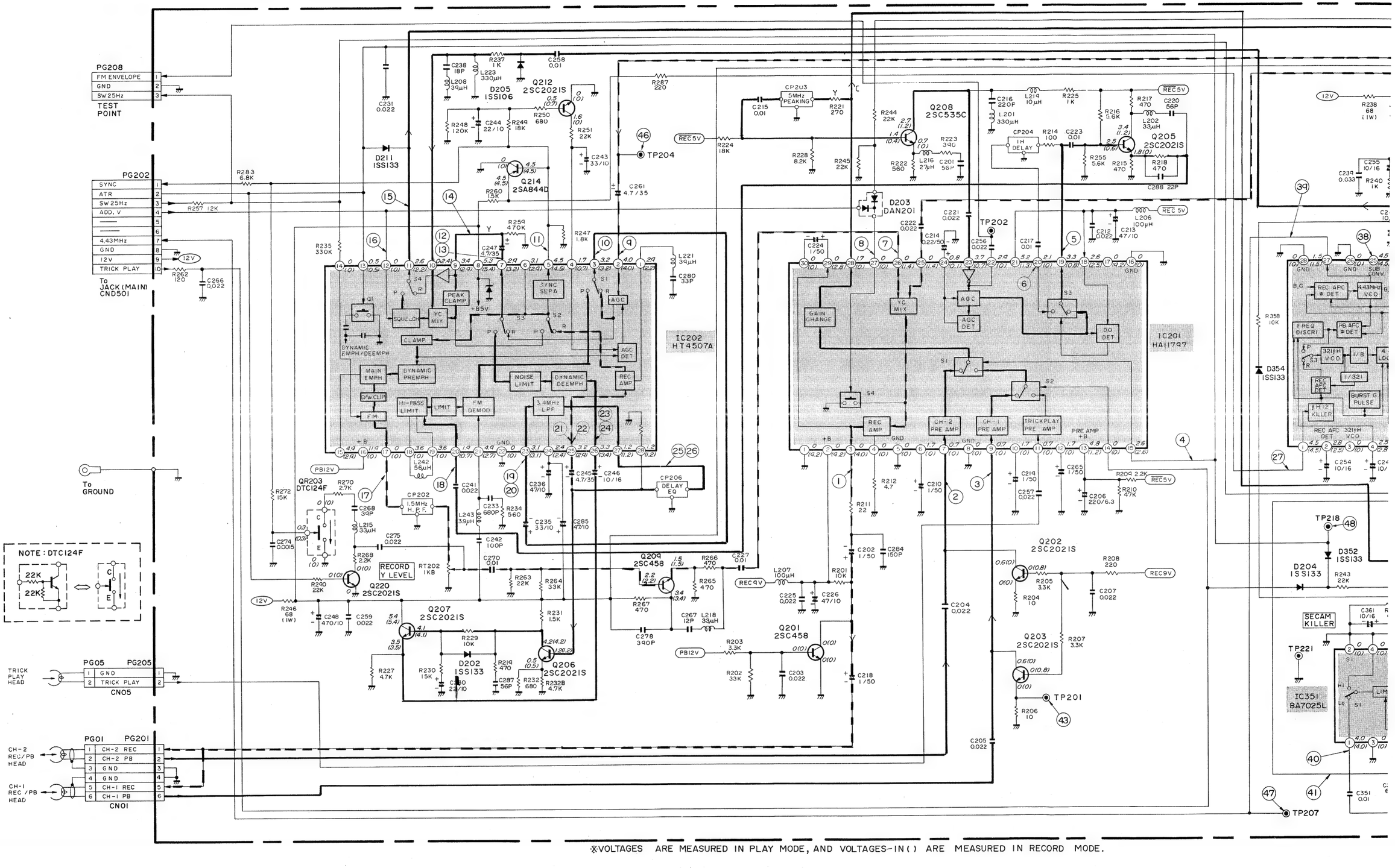
1	A5.6V
2	A17V
3	AC CLOCK
4	GND (S)
5	FM DET

To
SERVO (MAIN)
PG605
VIA
CN605

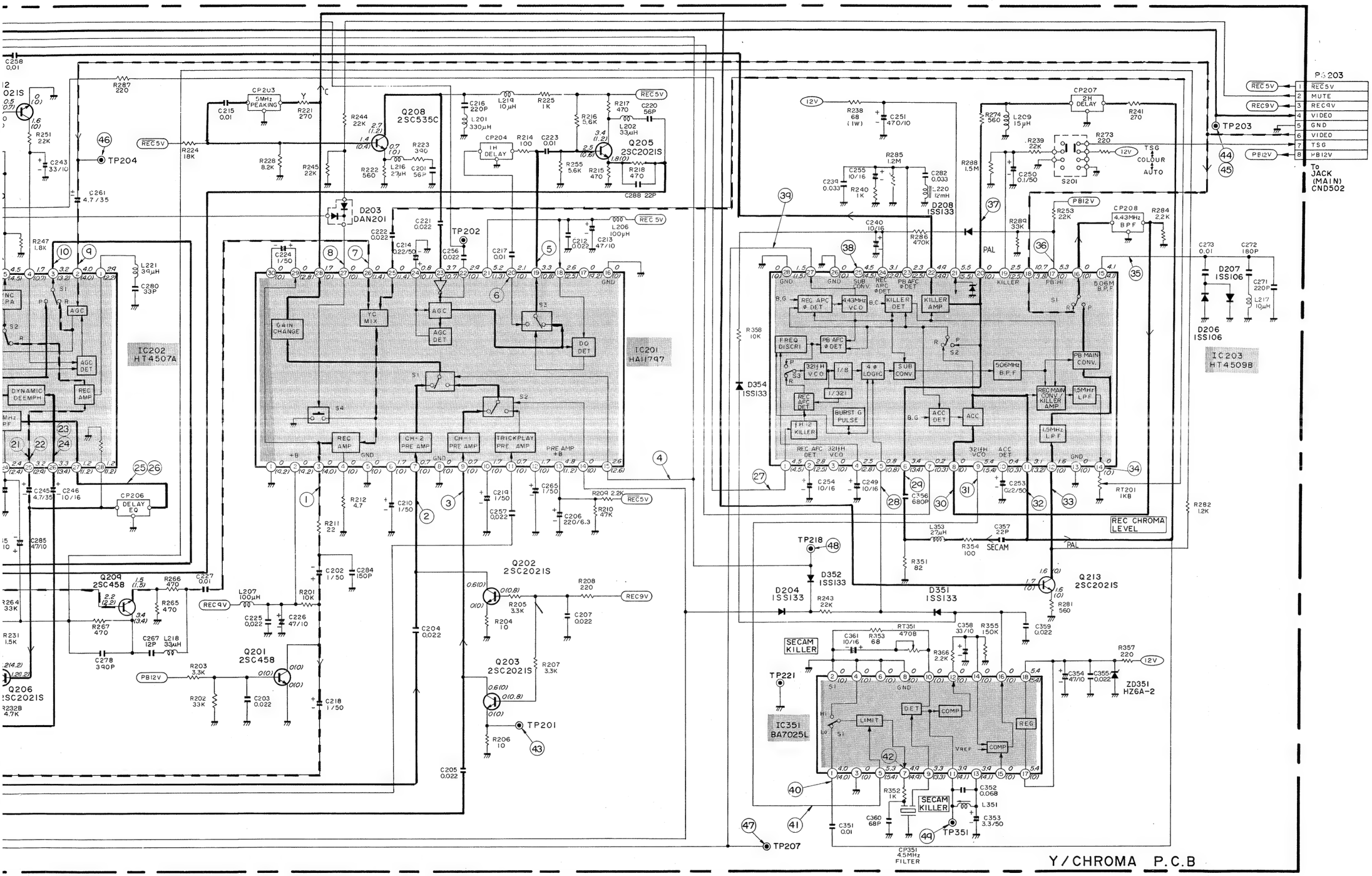
)DE.

BOARD (TYPE 4491,4493) 1/2

Y-CHROMA WYC FOR TYPE 4491 (H) AND TYPE 4493 (CT) 8004577



※VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES-IN( ) ARE MEASURED IN RECORD MODE.



※VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES-IN( ) ARE MEASURED IN RECORD MODE.

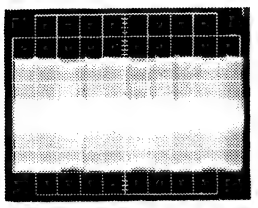
Y/CHROMA P.C.B

VHS91 Y/CHROMA SCHEMATIC (TYPE 4491,4493)

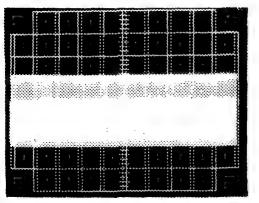
Y/CHROMA CIRCUIT WAVEFORM (TYPE 4491, 4493)

[IC201]

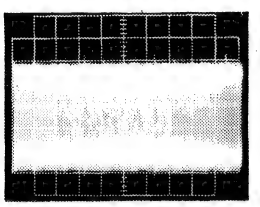
① PIN 3 REC
1V/20μs. div.



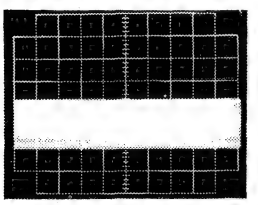
⑥ PIN 20 PB
50mV/0.1ms. div.



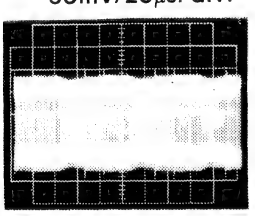
② PIN 7 REC
50mV/20μs. div.



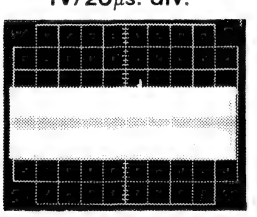
⑦ PIN 26 REC
50mV/0.5ms. div.



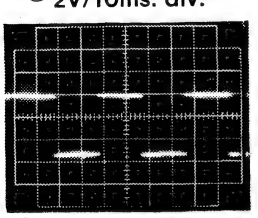
③ PIN 9 REC
50mV/20μs. div.



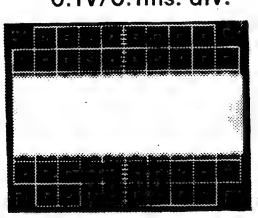
⑧ PIN 27 REC
1V/20μs. div.



④ PIN 15 REC
2V/10ms. div.

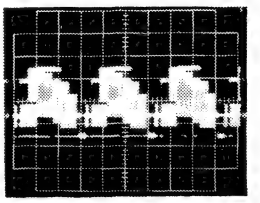


⑤ PIN 19 PB
0.1V/0.1ms. div.

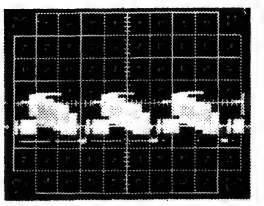


[IC202]

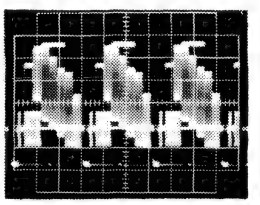
⑨ PIN 2 REC
0.2V/20μs. div.



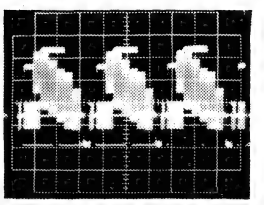
⑭ PIN 9 REC
0.1V/20μs. div.



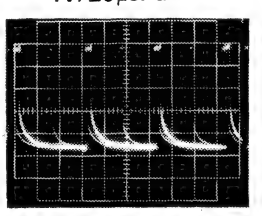
⑩ PIN 3 REC
50mV/20μs. div.



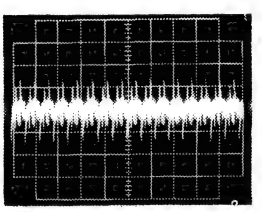
⑮ PIN 11 REC/PB
0.2V/20μs. div.



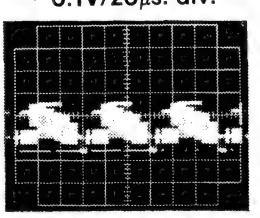
⑪ PIN 5 REC/PB
1V/20μs. div.



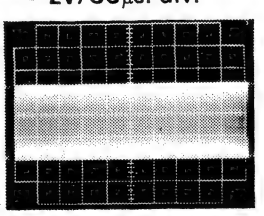
⑯ PIN 12 REC/PB
50mV/0.1ms. div.



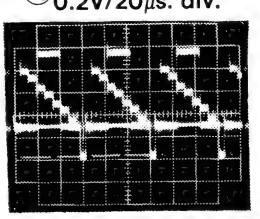
⑫ PIN 7 REC
0.1V/20μs. div.



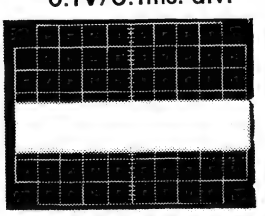
⑰ PIN 17 REC
2V/50μs. div.



⑬ PIN 7 PB
0.2V/20μs. div.

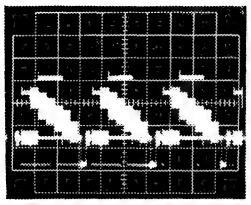


⑱ PIN 20 PB
0.1V/0.1ms. div.

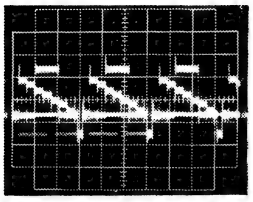


[IC202]

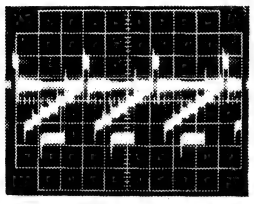
⑲ PIN23 REC
50mV/20μs. div.



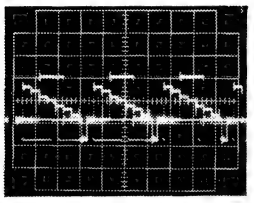
㉔ PIN26 PB
0.1V/20μs. div.



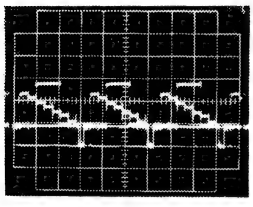
⑳ PIN23 PB
50mV/20μs. div.



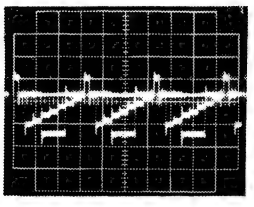
㉕ PIN27 REC
0.1V/20μs. div.



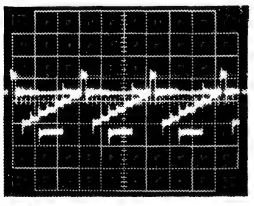
㉑ PIN25 REC
0.1V/20μs. div.



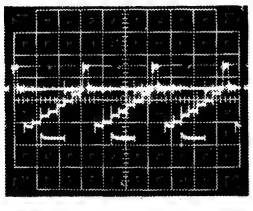
㉖ PIN27 PB
0.1V/20μs. div.



㉒ PIN25 PB
0.1V/20μs. div.

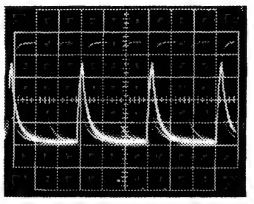


㉓ PIN26 REC
0.1V/20μs. div.

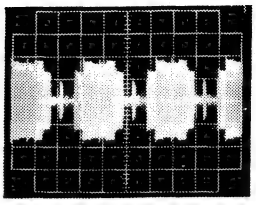


[IC203]

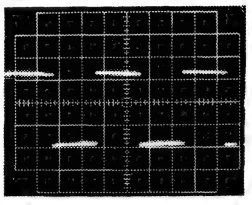
㉗ PIN1 REC/PB
1V/20μs. div.



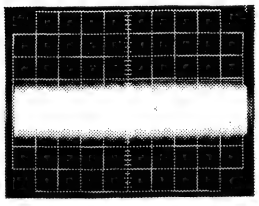
㉜ PIN11 REC
0.2V/20μs. div.



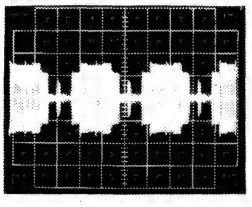
㉘ PIN5 REC/PB
0.5V/10ms. div.



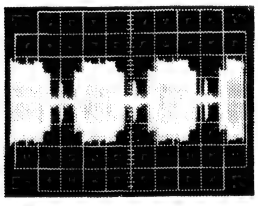
㉝ PIN12 PB
50mV/0.1ms. div.



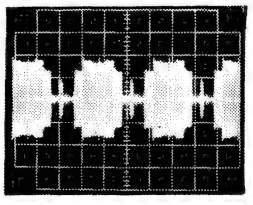
㉙ PIN6 REC/PB
50mV/20μs. div.



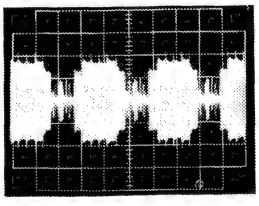
㉞ PIN14 REC
50mV/20μs. div.



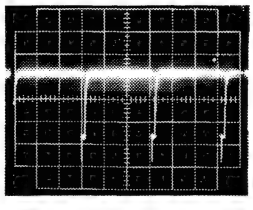
㉚ PIN8 REC
50mV/20μs. div.



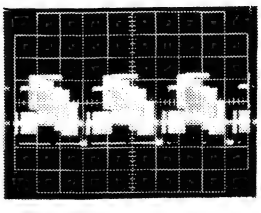
㉟ PIN15 REC/PB
50mV/20μs. div.



㉛ PIN9 REC/PB
0.5V/20μs. div.



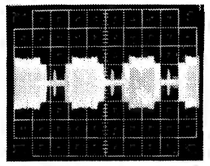
㊱ PIN17 REC
0.2V/20μs. div.



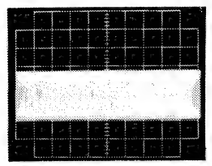
Y-CHROMA PCB

[IC203]

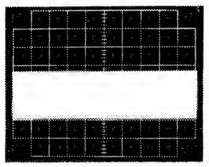
㊲ PIN20 REC/PB 50mV/20μs. div.



㊳ PIN25 REC 0.1V/0.5ms. div.

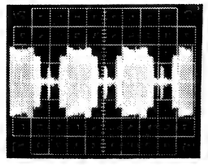


㊴ PIN27 REC 0.1V/0.2ms. div.

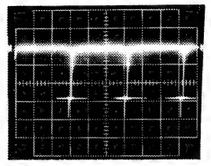


[IC351]

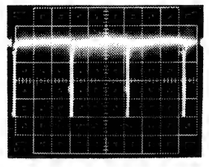
㊵ PIN1 REC/PB 0.2V/20μs. div.



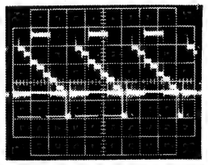
㊶ PIN5 REC/PB 0.5V/20μs. div.



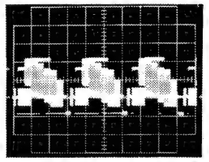
㊷ PIN7 REC/PB 0.5V/20μs. div.



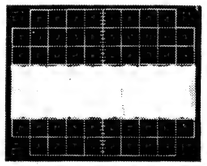
㊺ TP203 PB 0.2V/20μs. div.



㊻ TP204 REC 0.2V/20μs. div.

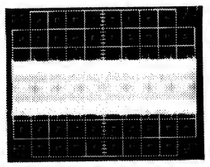


㊼ TP207 REC/PB 0.1V/0.1ms. div.

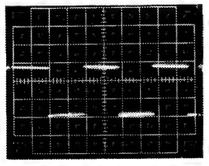


[TEST POINT]

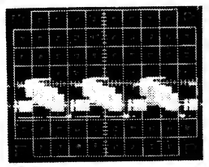
㊸ TP201 REC 50mV/50μs. div.



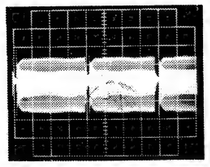
㊽ TP218 REC/PB 2V/10ms. div.

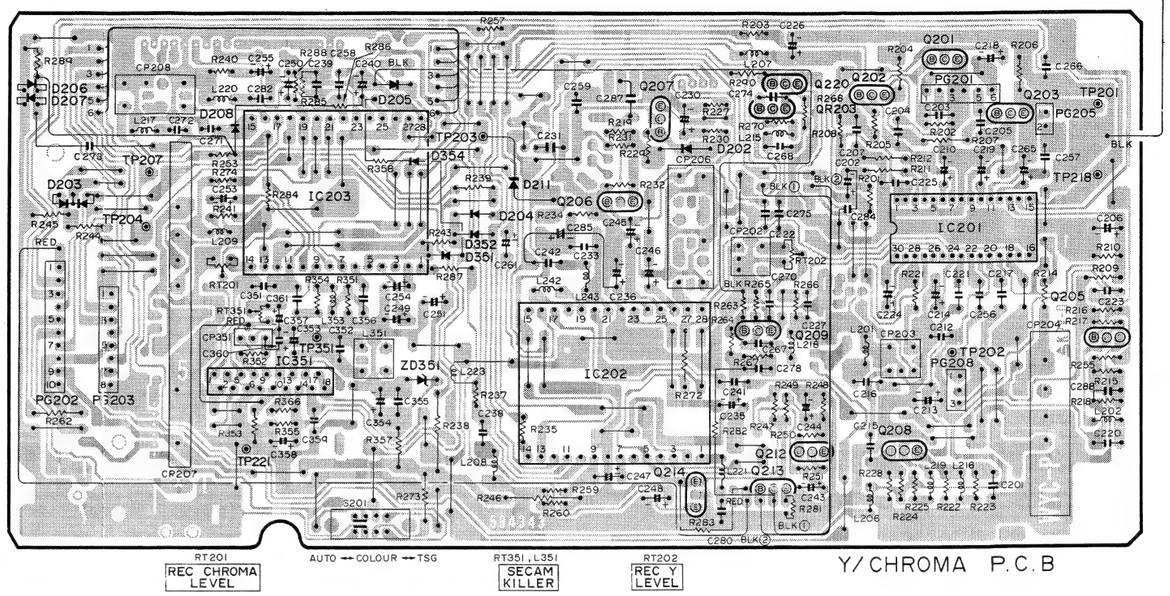


㊹ TP203 REC 0.5V/20μs. div.



㊾ TP351 REC 0.5V/5ms. div.





IC201

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0(9.2)	0(9.2)	0(4.0)	0(0)	0(0)	1.7(0)	0.7(0)	0(0)	0.7(0)	1.7(0)	0.7(0)	1.7(0)	4.8(1.2)	0(0)	2.6(2.6)
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
0(0)	0(2.8)	1.7(0)	0(0)	0(1.4)	0(1.4)	0.8(0.1)	3.7(0.7)	2.9(1.0)	5.2(1.3)	2.1(0)	3.3(0.8)	2.6(2.5)	0(9.2)	0(0)

IC202

15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.9(2.9)	11.9(1.0)	0(0)	3.6(1.0)	3.6(1.0)	1.9(0.7)	4.9(2.7)	0(1.0)	3.1(3.1)	2.4(2.4)	3.2(2.9)	3.3(3.4)	1.2(1.2)	1.2(1.2)
14	13	12	11	10	9	8	7	6	5	4	3	2	1
0(0)	0.5(0.5)	0(0)	2.6(2.2)	0(2.4)	3.4(2.9)	5.3(5.4)	2.9(3.2)	3.1(2.9)	4.5(4.5)	1.7(0.7)	3.2(3.2)	4.0(4.0)	2.9(2.2)

IC203

15	16	17	18	19	20	21	22	23	24	25	26	27	28
4.1(4.1)	0(0)	5.3(0)	10.7(3.8)	2.5(2.5)	0(0)	5.5(5.5)	4.4(4.9)	2.3(2.5)	3.1(2.9)	4.5(4.5)	0(0)	1.5(1.5)	0(0)
14	13	12	11	10	9	8	7	6	5	4	3	2	1
0(0)	0(0)	1.6(0)	3.1(3.2)	0.4(0.3)	5.4(5.4)	0(0)	0.2(0.3)	3.4(3.4)	0.8(0.8)	2.5(2.8)	0(0)	2.8(2.5)	4.5(4.5)

IC351

1	3	5	7	9	11	13	15	17
4.0(4.0)	0(0)	5.3(5.4)	4.9(4.9)	3.3(3.3)	3.9(4.1)	3.9(4.1)	0(0)	5.4(0)
2	4	6	8	10	12	14	16	18
0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	5.4(5.4)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

PG201

1	CH-2 REC
2	CH-2 PB
3	GND
4	GND
5	CH-1 REC
6	CH-1 PB

To VIDEO HEAD PG01 VIA CN01

PG202

1	SYNC
2	ATR
3	SW25Hz
4	ADD. V
5	——
6	——
7	4.43MHz
8	GND
9	12V
10	TRICK PLAY

To JACK (MAIN) CND501

PG203

1	REC 5V
2	MUTE
3	REC 9V
4	VIDEO
5	GND
6	VIDEO
7	TSG
8	PB12V

To JACK (MAIN) CND502

PG205

1	GND
2	TRICK PLAY

To VIDEO HEAD PG05 VIA CN05

PG208

1	FM ENVELOPE
2	GND
3	SW25Hz

TEST POINT

Q201		Q202		Q203	
B	0(0)	B	0(0.8)	B	0(0.8)
C	0(0)	C	0.6(0)	C	0.6(0)
E	0(0)	E	0(0)	E	0(0)

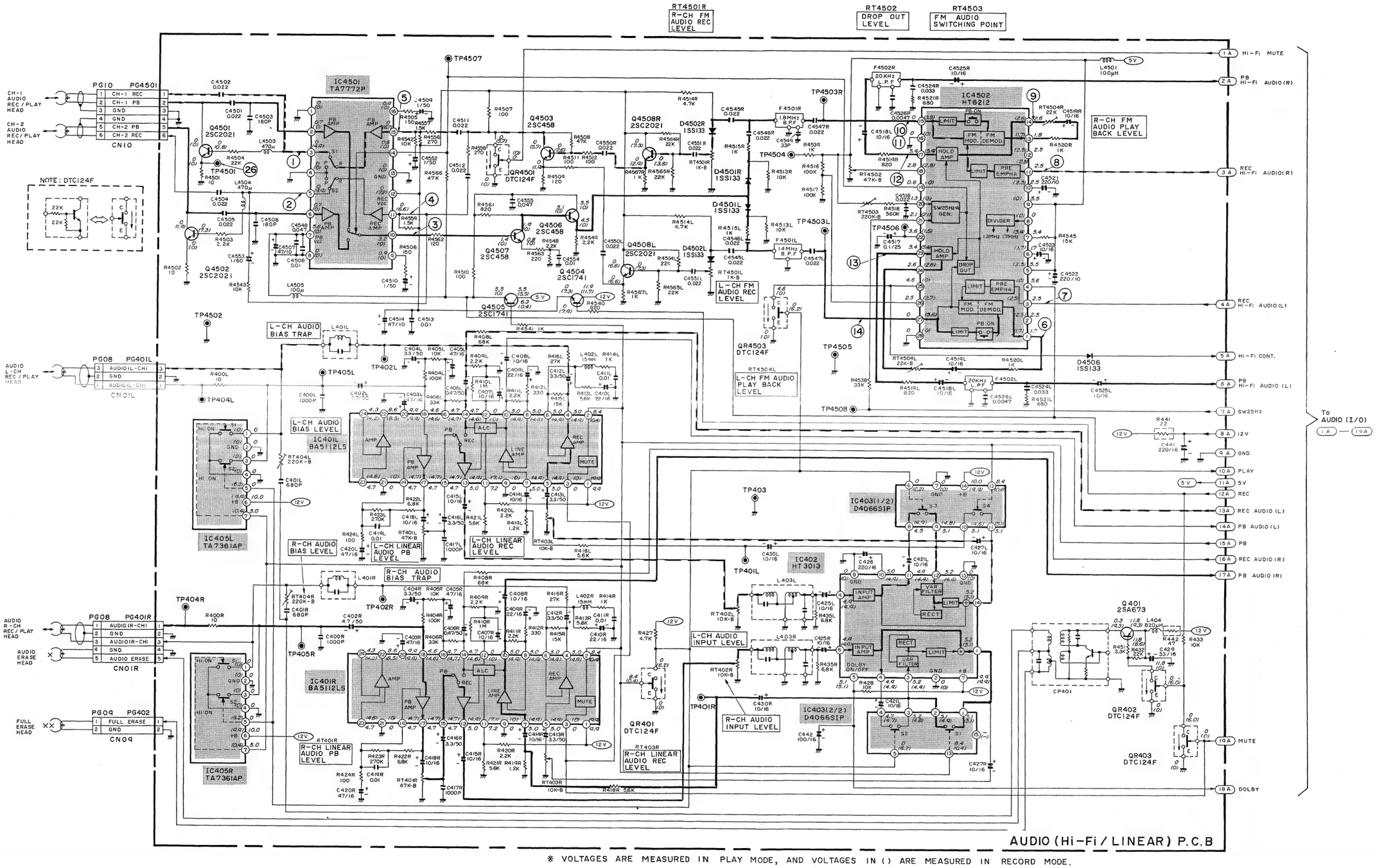
Q205		Q206		Q207	
B	2.5(0.6)	B	1.2(1.2)	B	4.1(4.1)
C	3.4(1.2)	C	4.2(4.2)	C	5.4(5.4)
E	1.8(0)	E	0.5(0.5)	E	3.5(3.5)

Q208		Q209		Q212	
B	1.4(0.4)	B	2.2(2.2)	B	0.5(0.7)
C	2.7(1.2)	C	3.4(3.4)	C	1.6(0)
E	0.7(0)	E	1.5(1.5)	E	0(0)

QR203		Q213		Q214		Q220	
B	0.3(0.3)	B	1.7(0)	B	4.5(4.5)	B	0(0)
C	0(0)	C	1.6(0)	C	0(0)	C	0(0)
E	0(0)	E	1.6(0)	E	4.5(4.5)	E	0(0)

VHS91 Y/CHROMA BOARD (TYPE 4491, 4493) 1/2

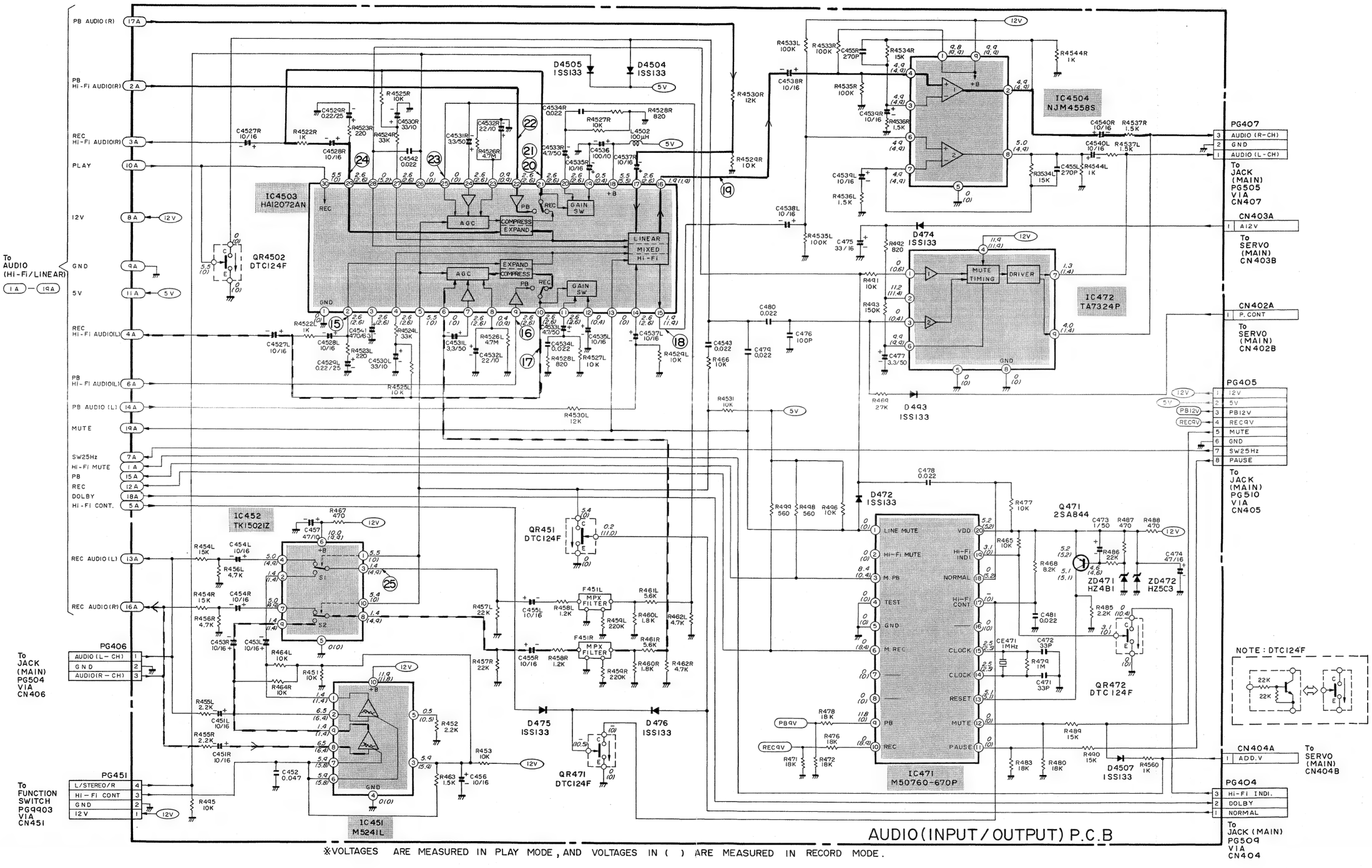
VHS91 Y/CHROMA BOARD (TYPE 4491, 4493) 2/2



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS 91 AUDIO (HI-FI / LINEAR) SCHEMATIC

AUDIO INPUT/OUTPUT 8004580



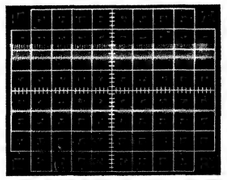
※VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

1-28

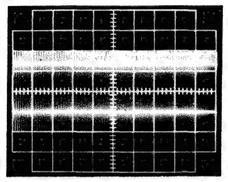
AUDIO CIRCUIT WEVEFORMS(1/2)

[IC4501]

① PIN 3 REC
IV/20μs. div.

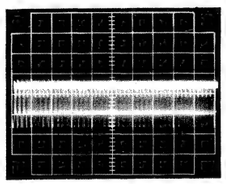


② PIN 5 REC
IV/20μs. div.

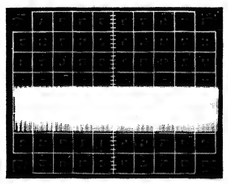


③ PIN 10 PB
0.2V/20μs. div.

④ PIN 11 REC
50mV/10μs. div.

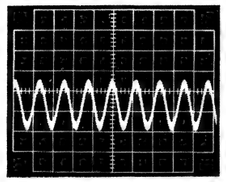


⑤ PIN 15 REC
50mV/10μs. div.

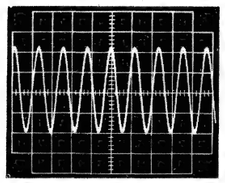


[IC4502]

⑥ PIN 1 PB
50mV/2ms. div.

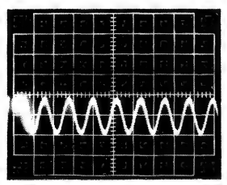


⑦ PIN 3 REC
0.1V/2ms. div.

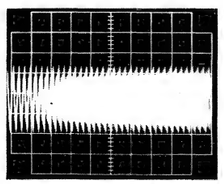


⑧ PIN 11 REC
0.1V/2ms. div.

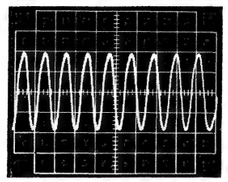
⑨ PIN 14 PB
20mV/2ms. div.



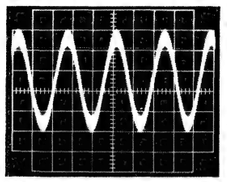
⑩ PIN 15 PB
0.1V/2μs. div.



⑪ PIN 15 REC
0.5V/0.5μs. div.

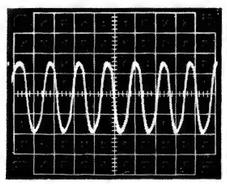


⑫ PIN 17 PB
0.1V/1ms. div.



⑬ PIN 23 PB
0.1V/1ms. div.

⑭ PIN 27 REC
0.2V/0.5μs. div.

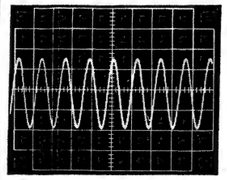


1-28

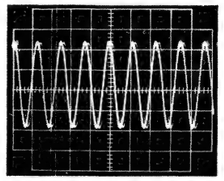
AUDIO CIRCUIT WAVEFORMS(2/2)

[IC4503]

⑮ PIN 2 PB
0.1V/2ms. div.

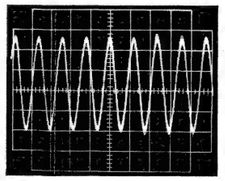


⑯ PIN 9 PB
0.1V/2ms. div.

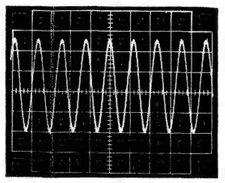


⑰ PIN 10 PB
0.1V/2ms. div.

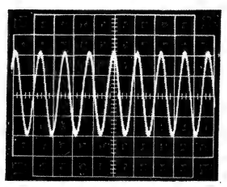
⑱ PIN 15 PB
20mV/2ms. div.



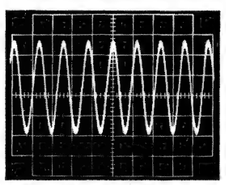
⑲ PIN 16 PB
20mV/2ms. div.



⑳ PIN 21 PB
0.1V/2ms. div.

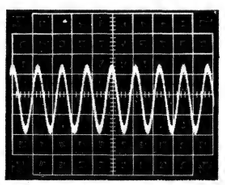


㉑ PIN 21 REC
0.1V/2ms. div.

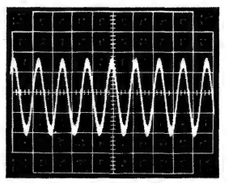


㉒ PIN 22 PB
0.1V/2ms. div.

㉓ PIN 25 REC
5mV/2ms. div.

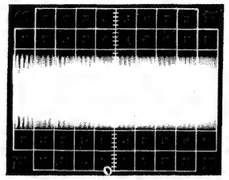


㉔ PIN 29 PB
5mV/2ms. div.



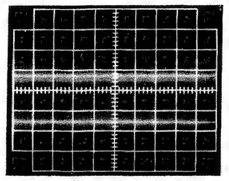
[IC452]

㉕ PIN 3 REC
10mV/10μs. div.

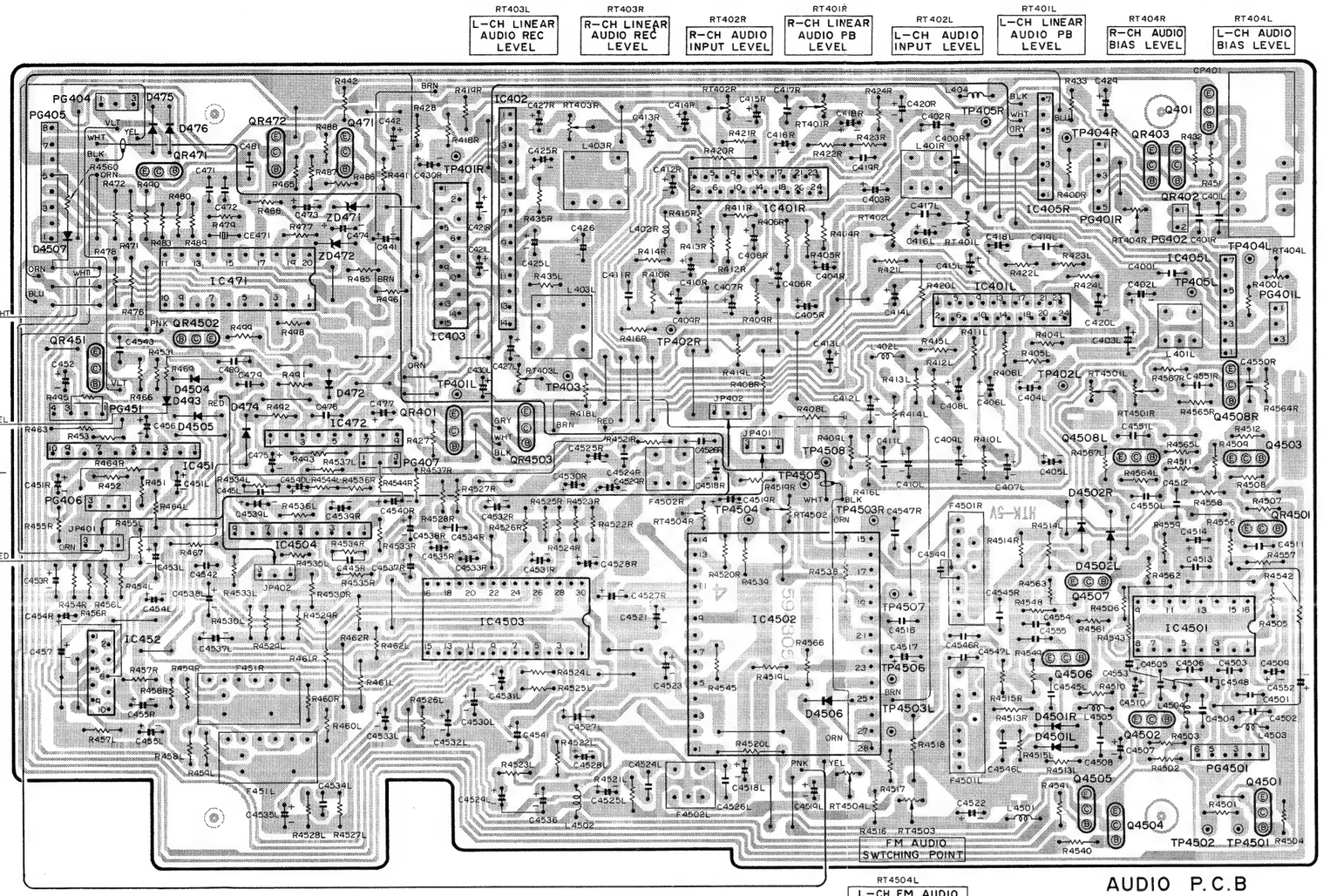


[TEST POINT]

㉖ TP 4501 REC
50mV/50μs. div.



AUDIO PCB



L401R R-CH AUDIO BIAS TRAP

L401L L-CH AUDIO BIAS TRAP

RT4501R R-CH FM AUDIO REC LEVEL

RT4501L L-CH FM AUDIO REC LEVEL

RT4504L L-CH FM AUDIO PLAYBACK LEVEL

RT4504R R-CH FM AUDIO PLAYBACK LEVEL

RT4502 DROP OUT LEVEL

PG401L

1	AUDIO (L-CH)
2	GND
3	AUDIO (L-CH)

To L-CH AUDIO REC/PB HEAD PG08 VIA CNOIL

PG401R

1	AUDIO (R-CH)
2	GND
3	AUDIO (R-CH)
4	GND
5	AUDIO ERASE

To R-CH AUDIO REC/PB HEAD PG08 VIA CNOIR

PG402

1	FULL ERASE
2	GND

To FULL ERASE HEAD PG09 VIA CN09

PG404

1	NORMAL
2	DOLBY
3	Hi-FI INDI.

To JACK (MAIN) PG509 VIA CN404

PG405

1	12V
2	5V
3	PB12V
4	REC9V
5	MUTE
6	GND
7	SW25Hz
8	PAUSE

To JACK (MAIN) PG510 VIA CN405

PG406

1	AUDIO (L-CH)
2	GND
3	AUDIO (R-CH)

To JACK (MAIN) PG504 VIA CN406

PG407

1	AUDIO (L-CH)
2	GND
3	AUDIO (R-CH)

To JACK (MAIN) PG505 VIA CN407

PG451

1	12V
2	GND
3	Hi-FI CONT
4	L/STEREO/R

To FUNCTION SWITCH PG9903 VIA CN451

PG4501

1	CH-1 REC
2	CH-1 PB
3	GND
4	GND
5	CH-2 PB
6	CH-2 REC

To FM AUDIO REC/PB HEAD PG10 VIA CN10

IC401L

1	3	5	7	9	11	13	15	17	19	21	23
9.9(9.9)	0 (0)	5.0(4.9)	5.0(4.9)	0 (0)	7.2(7.1)	5.0(4.9)	4.7(4.7)	4.7(4.7)	4.7(4.7)	0 (0)	4.7(4.6)
2	4	6	8	10	12	14	16	18	20	22	24
8.4(0.4)	5.0(4.9)	5.0(4.9)	5.0(4.9)	5.0(4.9)	0 (0)	4.7(4.6)	4.7(4.7)	4.6(4.6)	9.9(9.9)	8.6(8.5)	4.3(4.2)

IC401R

1	3	5	7	9	11	13	15	17	19	21	23
9.9(9.9)	0 (0)	5.0(4.9)	5.0(4.9)	0 (0)	7.2(7.1)	5.0(4.9)	4.7(4.7)	4.7 (4.7)	4.7(4.7)	0 (0)	4.7(4.6)
2	4	6	8	10	12	14	16	18	20	22	24
8.4(0.4)	5.0(4.9)	5.0(4.9)	5.0(4.9)	5.0(4.9)	0(0)	4.7(4.6)	4.7(4.7)	4.6(4.6)	9.9(9.9)	8.6(8.5)	4.3(4.2)

IC403

1	5.1(5.1)	2	5.1(4.9)
3	5.2(4.8)	4	4.7(4.7)
5	0(6.2)	6	0(6.2)
7	0 (0)	8	4.5(4.9)
9	5.1(4.8)	10	5.1(4.6)
11	5.1(5.1)	12	8.4(0.4)
13	8.4(0.4)	14	10.0(9.9)
15	– (–)	–	——

IC451

10	9	8	7	6	5	4	3	2	1
11.9(11.8)	1.4(1.4)	6.5(6.4)	5.9(5.8)	5.9(5.8)	0.5(0.5)	0(0)	5.9(5.9)	6.5(6.4)	1.4(1.4)

IC471

11	12	13	14	15	16	17	18	19	20	
0(0)	0 (0)	5.1(5.1)	2.5(2.5)	2.5(2.5)	0(0)	– (0)	0 (5.2)	3.1(0)	5.2(5.2)	
10	9	8	7	6	5	4	3	2	1	
0(8.9)	11.8(0)	0 (0)	0 (0)	0(8.4)	0(0)	0 (0)	8.4(0.4)	0 (0)	0 (0)	

IC472

1	2	3	4	5	6	7	8	9
0(0.6)	11.2(11.4)	0(0.4)	11.9(11.9)	0(0)	9.9(9.9)	1.3(1.4)	0 (0)	4.0(1.4)

IC402

1	5.2(5.1)		
2	0 (0)		
3	5.2(4.4)		
4	4.9(4.4)		
5	5.1(5.1)		
6	4.9(4.4)		
7	9.9(9.9)		
8	0 (0)		
9	4.9(4.9)		
10	5.0(4.9)		
11	4.9(4.9)		
12	5.2(4.4)		
13	0 (0)		
14	5.2(5.1)		

IC405L

7	5.0(0.4)		
6	10.0(9.9)		
5	0 (6.2)		
4	0 (0)		
3	0 (0)		
2	0 (0)		
1	0 (0)		

IC405R

7	5.0(0.4)		
6	10.0(9.9)		
5	0 (6.2)		
4	0 (0)		
3	0 (0)		
2	0 (0)		
1	0 (0)		

IC452

1	5.5(0)	2	1.4(1.4)
3	1.4(4.9)	4	5.0(4.9)
5	0(0)	6	10.0(9.9)
7	5.0(4.9)	8	1.4(4.9)
9	1.4(1.4)	10	5.4 (0)

IC4504

9	8	7	6	5	4	3	2	1
9.9(9.9)	5.0(4.9)	4.9(4.9)	4.9(4.9)	0 (0)	4.9(4.9)	4.9(4.9)	4.9(4.9)	9.8(9.9)

IC4501

9	10	11	12	13	14	15	16
0.9(0)	3.2(0)	0(6.6)	0(7.2)	0 (0)	0.6(0)	0(6.7)	0.9(0)
8	7	6	5	4	3	2	1
0 (0)	5.6(0)	0.7(0)	0 (4.9)	0(0)	0 (4.9)	0.7(0)	0 (0)

IC4502

14	2.6(2.6)	15	0(3.5)
13	1.8(1.7)	16	0 (0)
12	2.5(2.5)	17	5.4(5.4)
11	2.5(2.5)	18	2.8(2.8)
10	2.5(2.5)	19	0.6(0)
9	5.5(0)	20	1.3(0)
8	0 (0)	21	2.1(2.1)
7	5.4(5.4)	22	3.6(1.5)
6	1.7(1.7)	23	5.4(5.4)
5	5.5(2.5)	24	2.6(2.6)
4	5.6 (0)	25	4.6(0)
3	2.5(2.5)	26	2.5(2.7)
2	2.5(2.5)	27	0(3.6)
1	1.7(1.7)	28	0 (0)

IC4503

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1.9(1.9)	2.6(2.6)	5.5(5.5)	0.5(0.4)	2.6(2.6)	2.6(2.6)	2.6(2.6)	0.9(0.9)	2.6(2.6)	0 (0)	0 (0)	2.6(2.6)	0(5.2)	2.6(2.6)	5.5(0)	
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
1.9(1.9)	2.6(2.6)	0(0)	0 (0.4)	2.6(2.6)	2.6(2.6)	2.6(2.6)	0.4(0.4)	2.6(2.6)	0 (0)	5.5(0)	2.6(2.6)	2.6(2.6)	2.6(2.6)	0 (0)	

Q401

B	11.8(8.6)
C	0.3(9.3)
E	11.8(9.3)

Q471

B	4.6(4.6)
C	5.1 (5.1)
E	5.2(5.2)

Q4501

B	0(0.8)
C	0 (0)
E	0 (0)

Q4502

B	0(7.3)
C	0 (1.9)
E	0 (0)

Q4503

B	0(2.6)
C	0 (5.7)
E	0 (1.9)

Q4504

B	0(7.9)
C	11.9(11.7)
E	0 (7.3)

Q4505

B	6.3(10.4)
C	5.5(5.5)
E	5.5(0)

Q4506

B	5.1(0)
C	5.5(0)
E	4.5(0)

Q4507

B	1.4(0)
C	1.9(0)
E	0.8(0)

Q4508R

B	0(3.6)
C	0(7.3)
E	0(2.9)

Q4508L

B	0(7.3)
C	0(6.6)
E	0(6.6)

QR401

B	8.4(0.4)
C	0(6.2)
E	0 (0)

QR402

B	0(6.0)
C	11.8(0)
E	0 (0)

QR403

B	0 (0)
C	0 (6.0)
E	0 (0)

QR451

B	0.2(11.0)
C	5.4 (0)
E	0 (0)

QR471

B	–(10.5)
C	–(0)
E	0 (0)

QR472

B	3.1 (0)
C	0(10.4)
E	0 (0)

QR4501

B	0 (0)
C	0(5.7)
E	0 (0)

QR4502

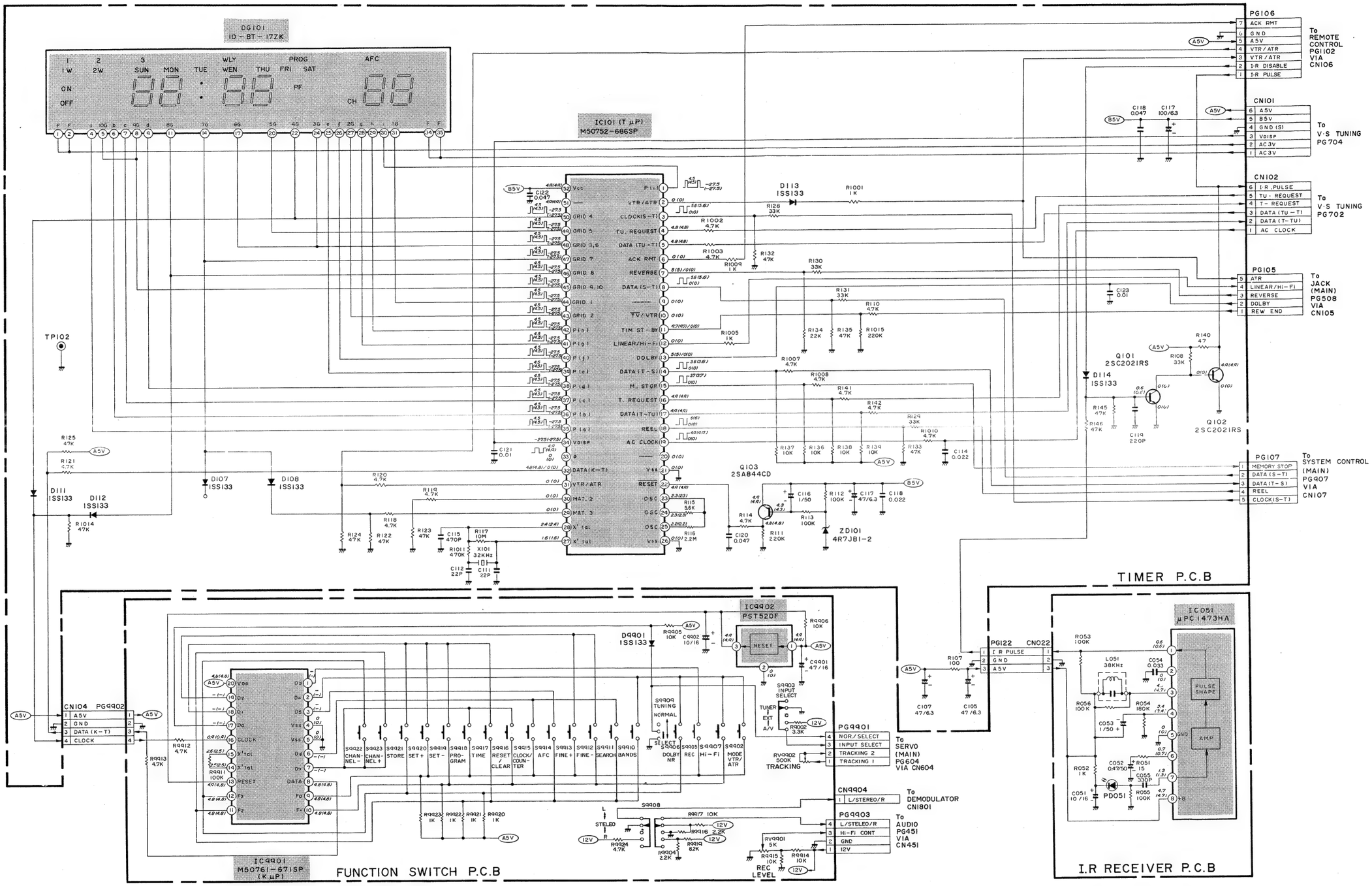
B	5.5 (0)
C	0 (0)
E	0 (0)

QR4503

B	0 (6.2)
C	4.6 (0)
E	0 (0)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

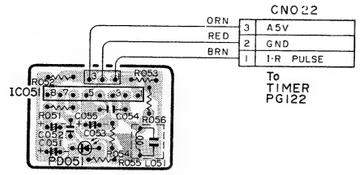
TIMER TIM FOR TYPE 4491 (H) AND TYPE 4492 (BS) 8004585 FUNCTION SWITCH 8004583 – INFRARED RECEIVER INF. 8004549



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 TIMER/FUNCTION SWITCH SCHEMATIC (TYPE4491,4492)

IR RECEIVER PCB

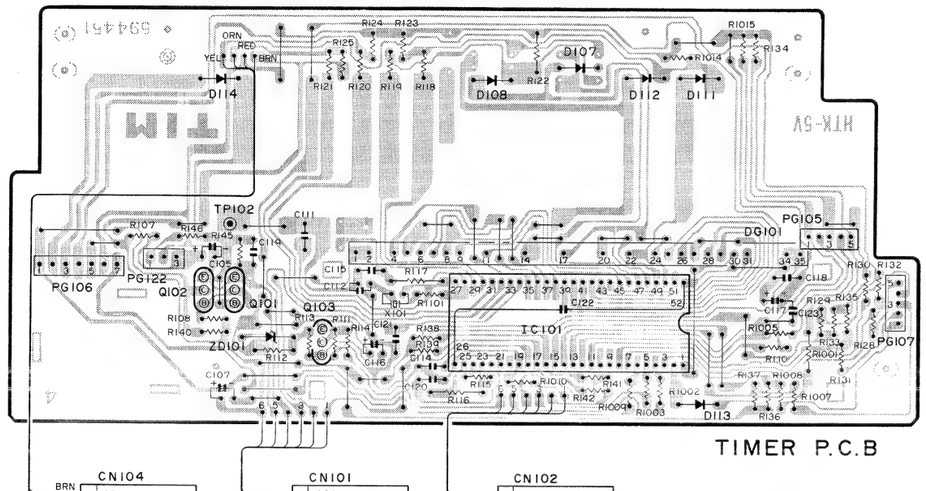


8	7	6	5	4	3	2	1
4.7 (4.7)	1.3 (1.3)	0.7 (0.7)	0 (0)	3.4 (3.4)	4.7 (4.7)	0 (0)	0.6 (0.6)

※VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 IR RECEIVER BOARD (1/2)

TIMER PCB



PG105

1	REW END
2	DOLBY
3	REVERSE
4	LINEAR/HI-FI
5	ATR

To JACK (MAIN) PG508 VIA CN105

PG122

1	I·R PULSE
2	GND
3	A5V

To I·R RECEIVER CN022

PG106

1	I·R PULSE
2	I·R DISABLE
3	VTR/ATR
4	VTR/ATR
5	A5V
6	GND
7	ACK RMT

To REMOTE CONTROL PG1102 VIA CN106

PG107

1	MEMORY STOP
2	DATA(S-T)
3	DATA(T-S)
4	REEL
5	CLOCK(S-T)

To SYSTEM CONTROL (MAIN) PG9907 VIA CN107

Q101

B	0.6 (0.6)
C	0 (0)
E	0 (0)

Q102

B	0 (0)
C	4.3 (4.9)
E	0 (0)

Q103

B	4.3 (4.3)
C	4.8 (4.8)
E	4.9 (4.9)

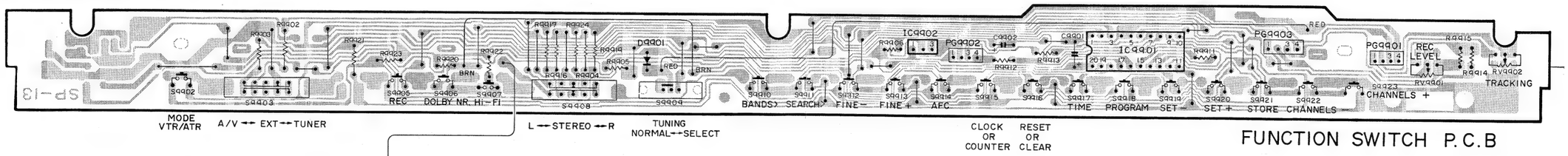
IC101

52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29	28	27
4.9 (4.9)	4.9 (4.9)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	−(−)	2.75 (2.75)	−(−)	−(−)	0 (0)	0 (0)	0 (0)	2.4 (2.4)	1.6 (1.6)
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
−(−)	0 (0)	−(−)	4.8 (4.8)	4.8 (4.8)	0 (0)	−(−)	−(−)	0 (0)	0 (0)	−(−)	0 (0)	−(−)	−(−)	−(−)	4.9 (4.9)	4.9 (4.9)	−(−)	−(−)	0 (0)	0 (0)	4.9 (4.9)	2.3 (2.3)	2.3 (2.3)	2.2 (2.2)	0 (0)

※VOLTAGE ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE

VHS 91 TIMER BOARD (TYPE 4491, 4492) 1/2

FUNCTION SWITCH PCB



PG9901

1	TRACKING 1
2	TRACKING 2
3	INPUT SELECT
4	NOR/SELECT

To SERVO (MAIN) PG604 VIA CN604

PG9902

1	A5V
2	GND
3	DATA(K-T)
4	CLOCK

To TIMER CN104

CN9904

1	L/STEREO/R

To DEMODULATOR CN1801

PG9903

1	12V
2	GND
3	Hi-Fi CONT
4	L/STEREO/R

To AUDIO PG451 VIA CN451

IC9901

1	2	3	4	5	6	7	8	9	10
−(−)	−(−)	−(−)	0 (0)	0 (0)	−(−)	−(−)	4.8 (4.8)	4.8 (4.8)	4.8 (4.8)
20	19	18	17	16	15	14	13	12	11
4.8 (4.8)	−(−)	−(−)	−(−)	0.9 (0.9)	2.6 (2.5)	2.5 (2.5)	4.9 (4.8)	4.8 (4.8)	4.8 (4.8)

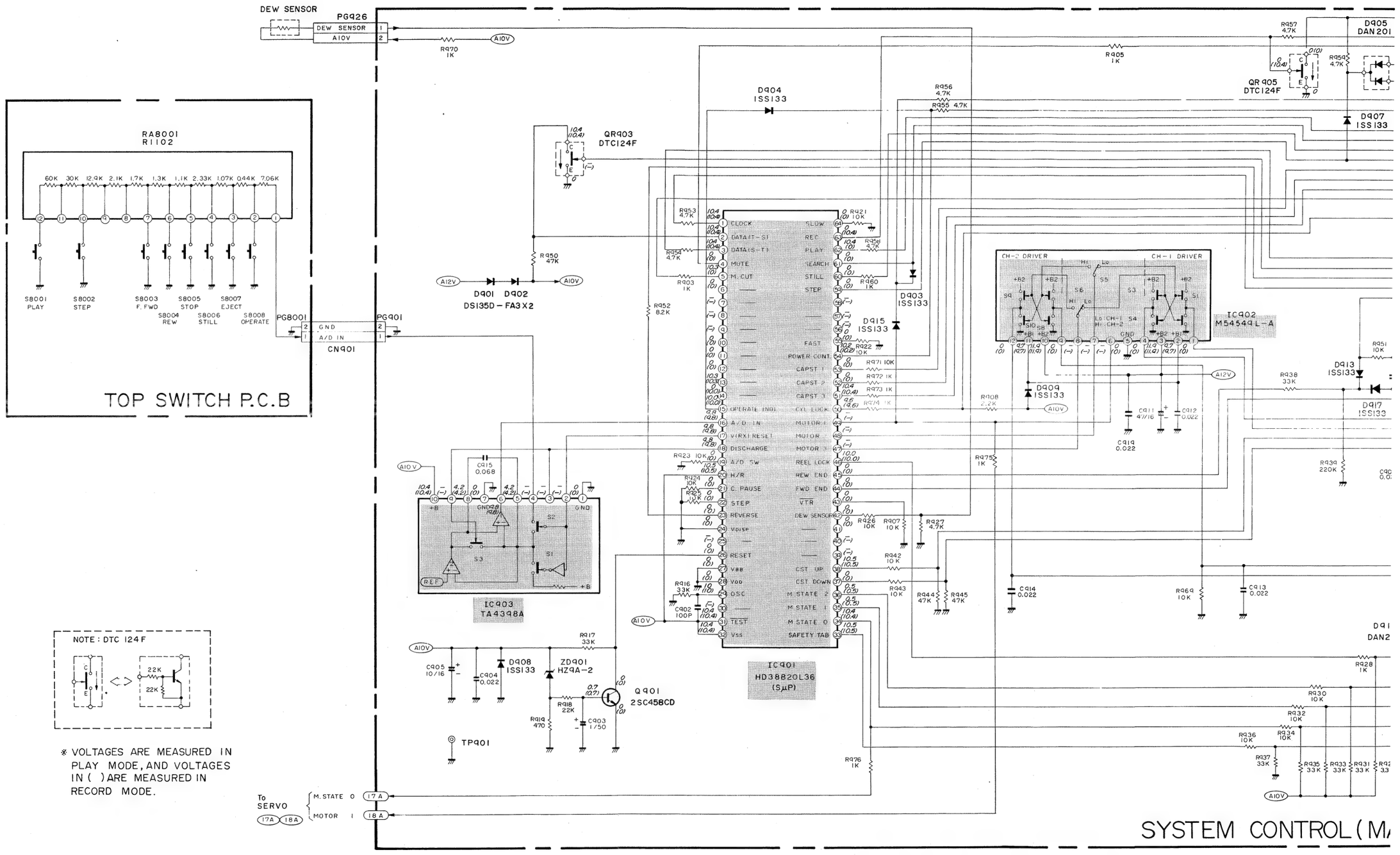
IC9902

1	2	3
4.9 (4.9)	0 (0)	4.9 (4.4)

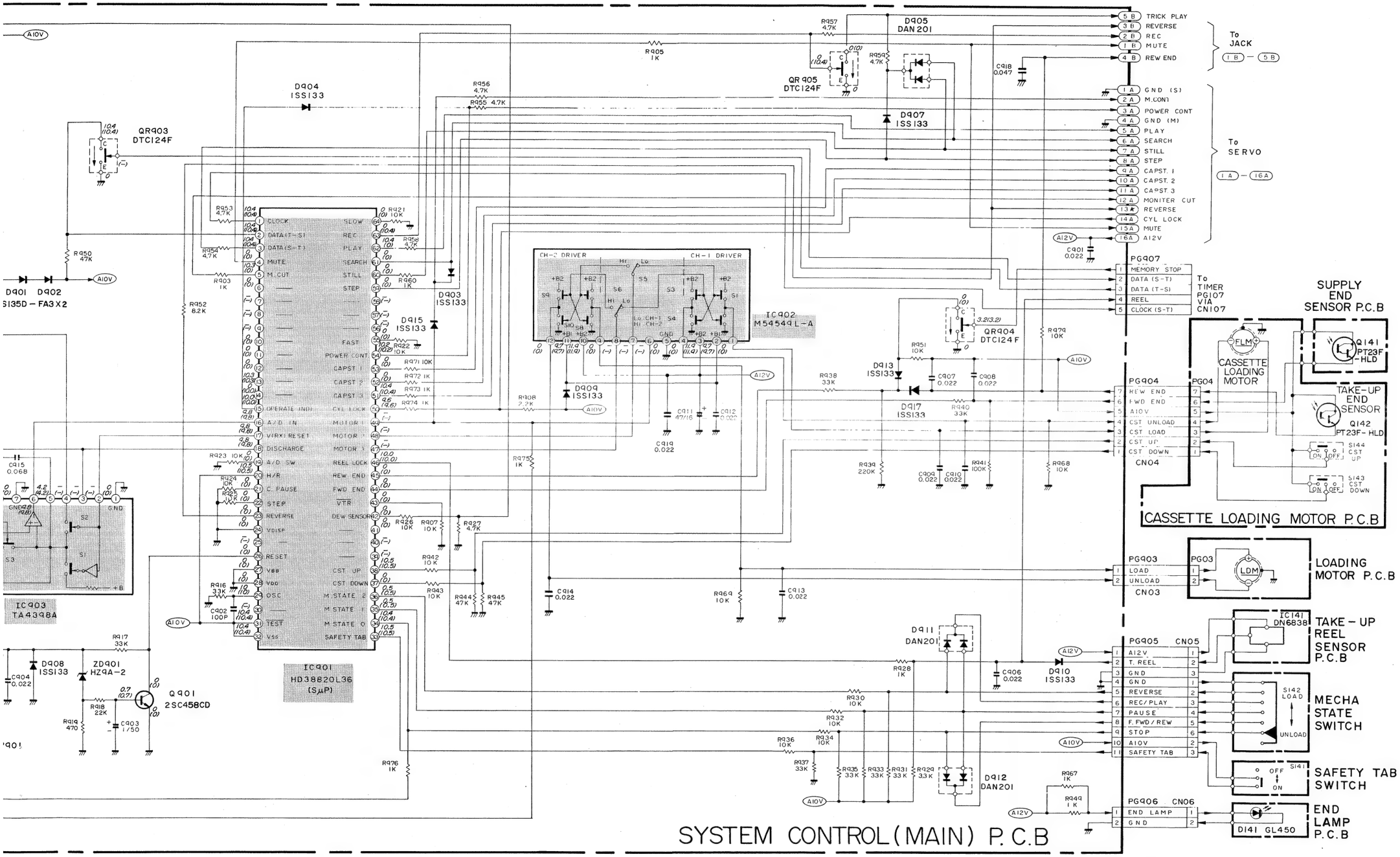
※VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN( ) ARE MEASURED IN RECORD MODE.

VHS91 FUNCTION SWITCH BOARD (2/2)
VHS91 FUNCTION SWITCH BOARD (1/2)

SYSTEM CONTROL MAIN **MAIN PCB FOR TYPE 4491 (H) 8004606 AND TYPE 4493 (CT) 8004579** **FOR TYPE 4492 (BS) 8004578 – TOP SWITCH 8004546**



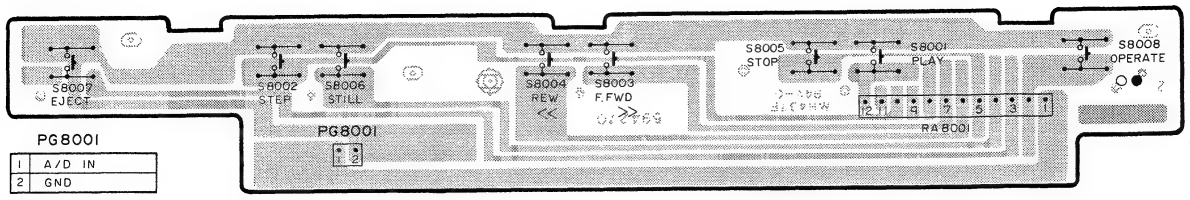
※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 SYSTEM CONTROL / TOP SWITCH SCHEMATIC

TOP SWITCH PCB



PG8001

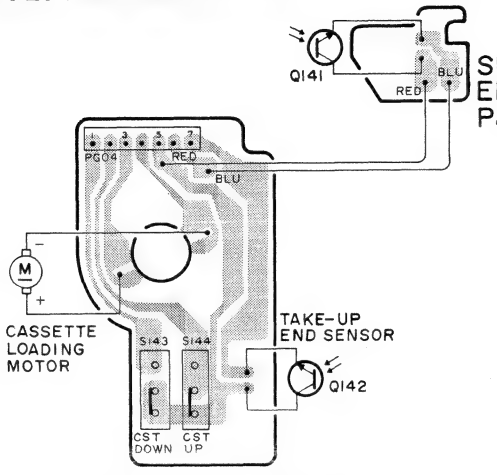
1	A/D IN
2	GND

To SYSTEM CONTROL (MAIN) PG901 VIA CN901

TOP SWITCH P.C.B

VHS 91 TOP SWITCH BOARD (1/2)

CASSETTE LOADING MOTOR AND SUPPLY END SENSOR PCB



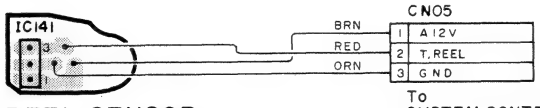
PG04

7	REW END
6	FWD END
5	A10V
4	CST UNLOAD
3	CST LOAD
2	CST UP
1	CST DOWN

To SYSTEM CONTROL (MAIN) PG904 VIA CN04

CASSETTE LOADING MOTOR P.C.B

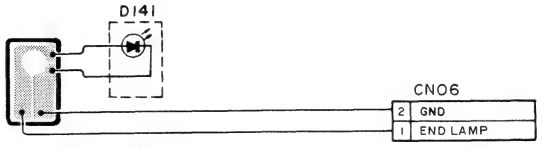
REEL SENSOR PCB



REEL SENSOR P.C.B

To SYSTEM CONTROL (MAIN) PG905

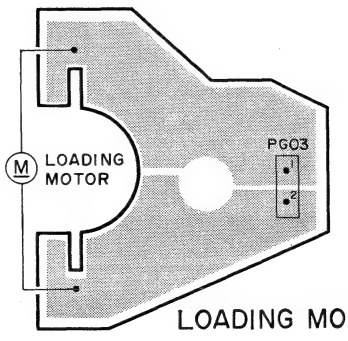
END LAMP PCB



END LAMP P.C.B

To SYSTEM CONTROL (MAIN) PG906

LOADING MOTOR



PG03

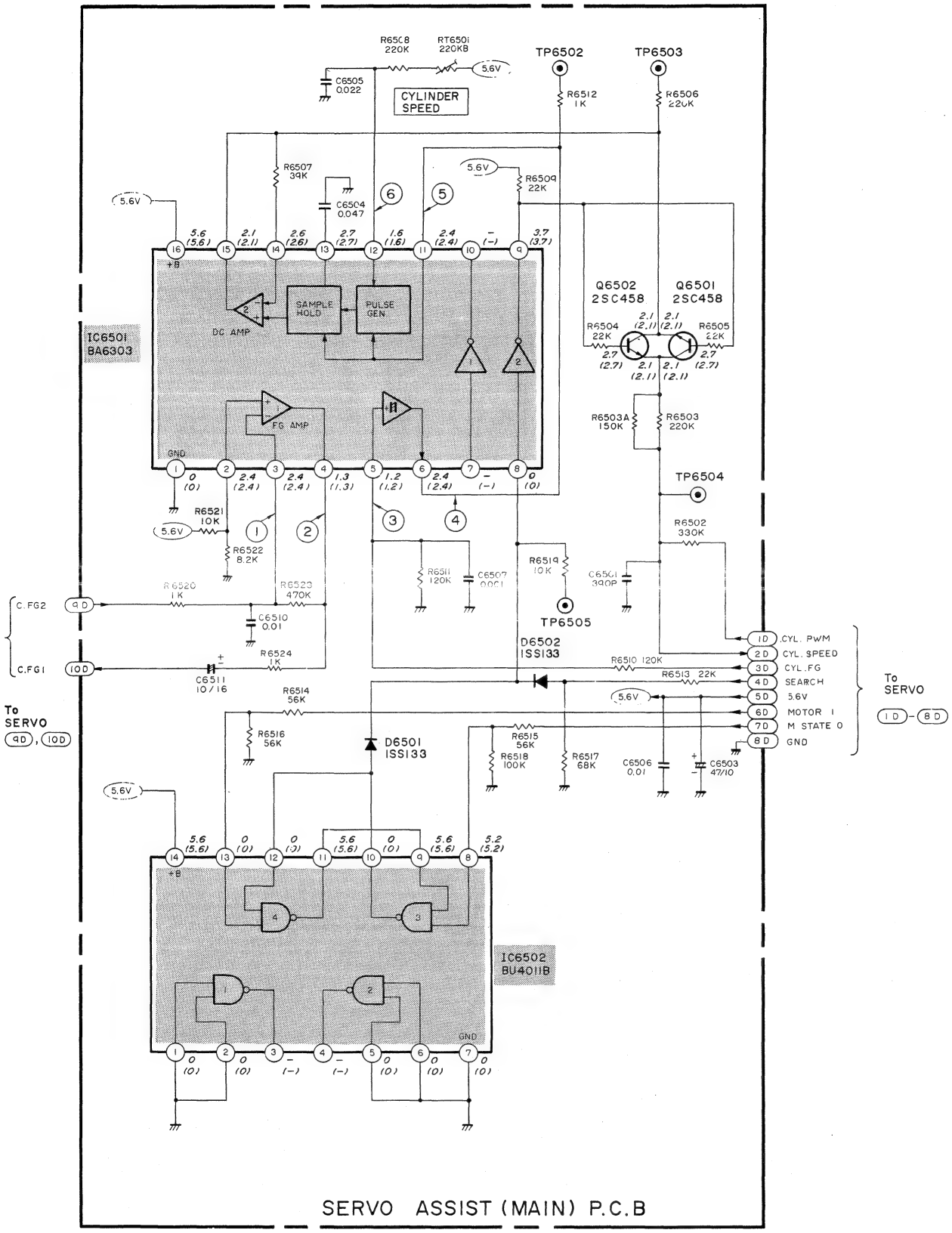
1	LOADING
2	UNLOADING

To SYSTEM CONTROL (MAIN) PG903 VIA CN03

LOADING MOTOR P.C.B

Bang&Olufsen

SERVO ASSIST MAIN

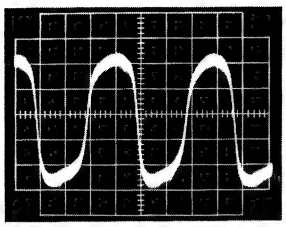


※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

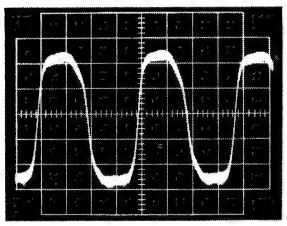
SERVO CIRCUIT WAVEFORM

[IC601]

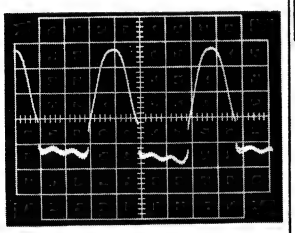
① PIN 1 PB/REC
50 mV/5 ms. div.



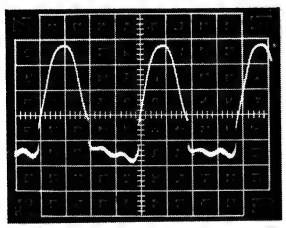
② PIN 2 PB/REC
50 mV/5 ms. div.



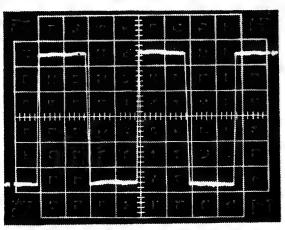
③ PIN 7 PB/REC
0.2V/5 ms. div.



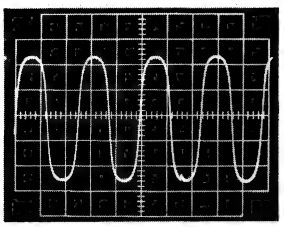
④ PIN 9 PB/REC
0.2V/5 ms. div.



⑤ PIN 11 PB/REC
0.2V/5 ms. div.

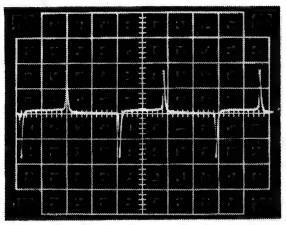


⑥ PIN 14 PB/REC
0.5V/2 ms. div.



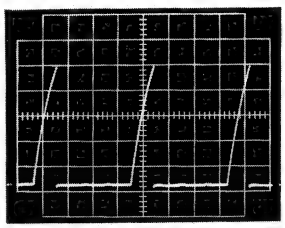
[IC602]

⑦ PIN 7 PB
1V/10 ms. div.

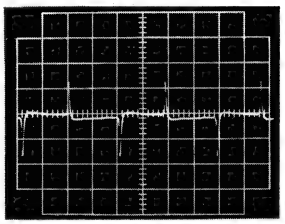


[IC604]

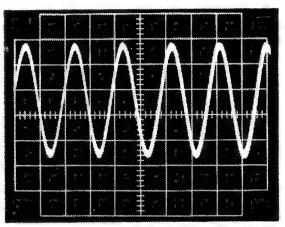
⑧ PIN 3 PB
0.5V/10 ms. div.



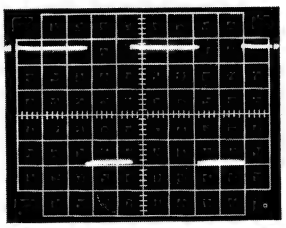
⑨ PIN 4 PB
1V/10 ms. div



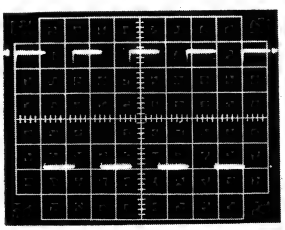
⑩ PIN 10 PB/REC
0.2V/1 ms. div.



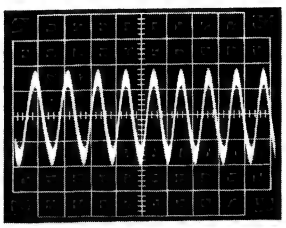
⑪ PIN 12 PB/REC
1V/0.2 ms. div



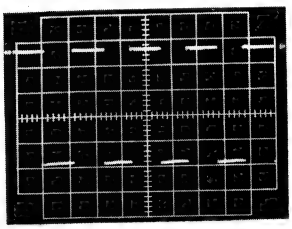
⑫ PIN 15 PB/REC
1V/50 μs. div.



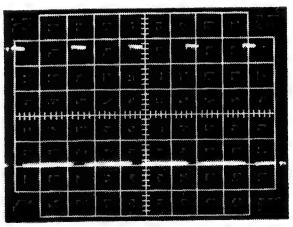
⑬ PIN 22 PB/REC
0.1V/0.2 μs. div.



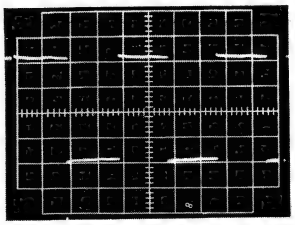
⑭ PIN 27 PB/REC
10V/0.2 ms. div.



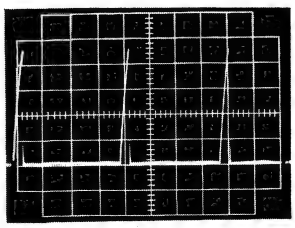
⑮ PIN 28 PB/REC
10V/0.2 ms. div.



⑯ PIN 31 PB/REC
10V/10 ms. div.

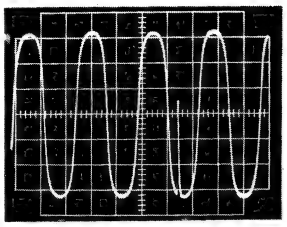


⑰ PIN 35 PB/REC
0.5V/5 ms. div.

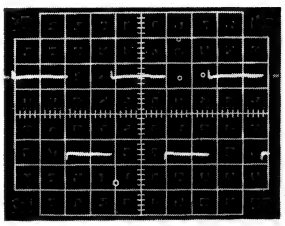


[IC604]

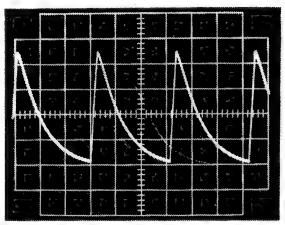
⑱ PIN 37 PB/REC
0.2V/2 ms. div.



⑲ PIN 39 REC
1V/10 ms. div.

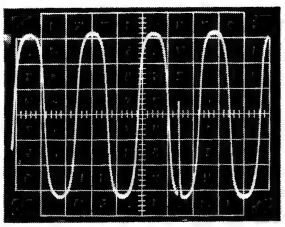


⑳ PIN 41 PB/REC
0.5V/20 μs. div

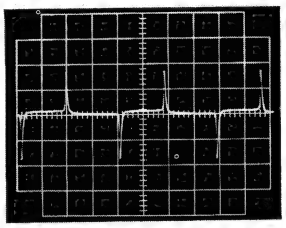


[TEST POINT]

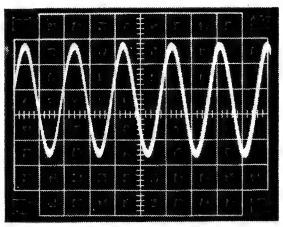
㉑ TP602 PB/REC
0.2V/2 ms. div.



㉒ TP605 PB
1V/10 ms. div.



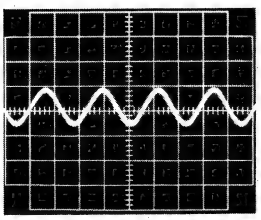
㉓ TP606 PB/REC
0.2V/1 ms. div.



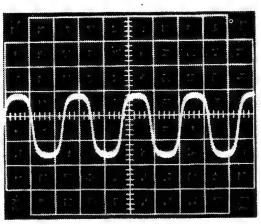
SERVO ASSIST CIRCUIT WAVEFORMS

[IC6501]

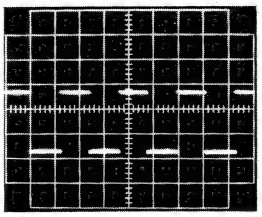
① PIN 3 REC/PB
50mV/0.5ms. div.



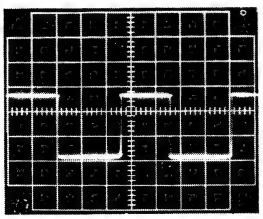
③ PIN 5 REC/PB
50mV/2ms. div.



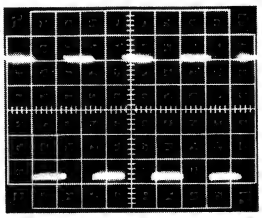
⑤ PIN 11 REC/PB
0.2V/2ms. div.



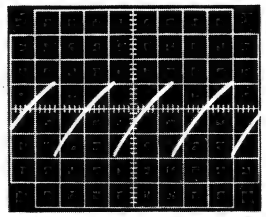
② PIN 4 REC/PB
0.1V/1ms. div.

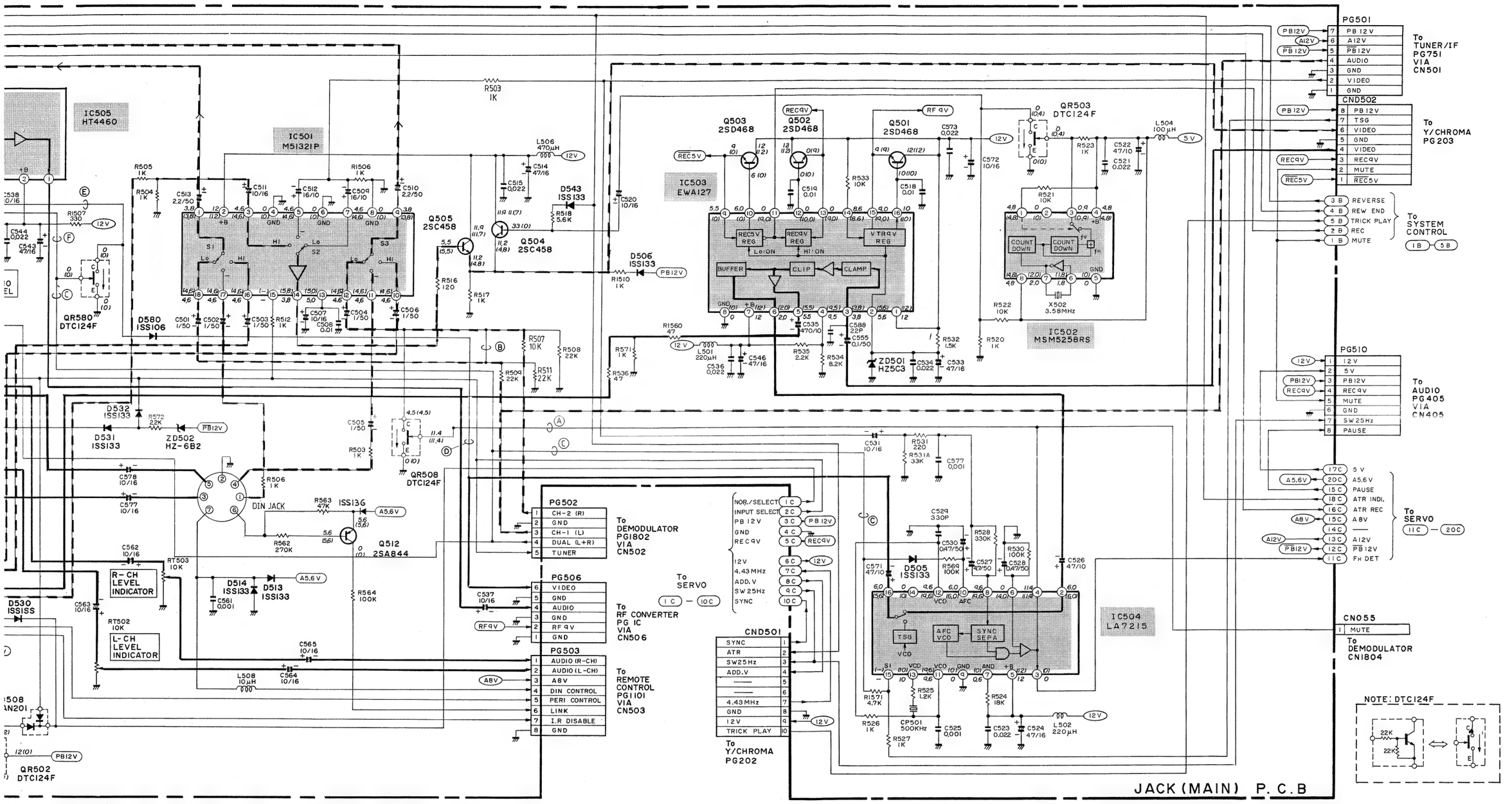


④ PIN 6 REC/PB
0.1V/2ms. div.



⑥ PIN 12 REC/PB
0.1V/2ms. div.





RED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHSQI JACK SCHEMATIC

PG501

1	GND
2	VIDEO
3	GND
4	AUDIO
5	$\overline{PB12V}$
6	A12V
7	PB12V

To TUNER / IF PG751 VIA CN501

PG502

1	CH-2 (R)
2	GND
3	CH-1 (L)
4	DUAL (L+R)
5	TUNER

To DEMODULATOR PG1802 VIA CN502

PG503

1	AUDIO (R-CH)
2	AUDIO (L-CH)
3	A8V
4	DIN CONTROL
5	PERI CONTROL
6	LINK
7	I-R DISABLE
8	GND

To REMOTE CONTROL PG1101 VIA CN503

PG504

1	AUDIO (L-CH)
2	GND
3	AUDIO (R-CH)

To AUDIO PG406 VIA CN406

PG505

1	AUDIO (L-CH)
2	GND
3	AUDIO (R-CH)

To AUDIO PG407 VIA CN407

PG506

1	GND
2	RF9V
3	GND
4	AUDIO
5	GND
6	VIDEO

To RF CONVERTER PG1C VIA CN506

PG507

1	GND (M)
2	TIMER INDI.
3	DOLBY INDI.
4	REC INDI.
5	A12V
6	ATR INDI.
7	HI-FI INDI.

To INDICATOR PG8101 VIA CN507

PG508

1	REW END
2	DOLBY
3	REVERSE
4	LINEAR/HI-FI
5	VTR/ATR

To TIMER PG105 VIA CN105

PG509

1	NORMAL
2	DOLBY
3	HI-FI INDI.

To AUDIO PG404 VIA CN404

PG510

1	12V
2	5V
3	PB12V
4	REC9V
5	MUTE
6	GND
7	SW25Hz
8	PAUSE

To AUDIO PG405 VIA CN405

IC501

18	4.6 (4.6)	1	3.8 (3.8)
17	4.6(4.6)	2	12 (12)
16	4.6(4.6)	3	4.6(4.6)
15	- (-)	4	0 (0)
14	3.8(5.8)	5	4.6(4.6)
13	5.0(5.0)	6	0 (0)
12	4.6 (4.6)	7	4.6 (4.6)
11	4.6(4.6)	8	0 (0)
10	4.6 (4.6)	9	3.8 (3.8)

IC502

8	4.8 (4.8)	1	4.8 (4.8)
7	2.0 (2.0)	2	0 (0)
6	1.8 (1.8)	3	0.9(0.9)
5	0 (0)	4	4.8 (4.8)

IC503

16	10 (10)	1	12 (12)
15	9.0 (9.0)	2	5.6(5.6)
14	8.6 (8.6)	3	3.8(3.8)
13	0 (9.0)	4	9.5 (9.5)
12	0(10.0)	5	5.5(5.5)
11	0 (9.0)	6	2.0(2.0)
10	6.0 (0)	7	12 (12)
9	5.5 (0)	8	0 (0)

IC504

15	- (-)	16	6.0 (5.6)
13	10 (10)	14	0 (0)
11	9.6(9.6)	12	9.6 (9.6)
9	0 (0)	10	6.0 (6.0)
7	0 (0.6)	8	9.6 (9.6)
5	12 (12)	6	0 (4.0)
3	0 (0)	4	11.4 (11.4)
-	———	2	6.0 (6.0)

Q501		Q502		Q503		Q504		Q505		Q508		Q509		Q510		Q512		QR580	
B	10 (10)	B	0 (0)	B	6 (0)	B	3.3(0)	B	5.5(5.5)	B	2.4(2.4)	B	2.5(2.5)	B	2.6(2.6)	B	5.6(5.6)	B	0(0)
C	12 (12)	C	12 (12)	C	12 (12)	C	11.9(11.7)	C	11.9(11.7)	C	0 (0)	C	10.1 (9.9)	C	10(9.9)	C	0 (0)	C	0(0)
E	9 (9)	E	0 (9)	E	9 (0)	E	11.2 (4.8)	E	11.2(4.8)	E	2.4(2.4)	E	1.9 (1.9)	E	2.0 (2.0)	E	5.6(5.6)	E	0(0)

QR501		QR502		QR503		QR505		QR506		QR507		QR508		QR509		QR510		QR515	
B	0 (12)	B	12 (0)	B	0.9(0.9)	B	0(5.6)	B	0(5.6)	B	11.4(11.4)	B	11.4(11.4)	B	0 (5.6)	B	0 (5.6)	B	8.2(11.6)
C	12 (12)	C	0 (12)	C	0 (0.4)	C	0(0)	C	0(0)	C	4.5(4.5)	C	4.5(4.5)	C	0(0)	C	0 (0)	C	0 (0)
E	12 (12)	E	0 (0)	E	0 (0)	E	0(0)	E	0(0)	E	0 (0)	E	0 (0)	E	0(0)	E	0(0)	E	0(11.7)

QR516

B	11.9(11.8)
C	0 (0)
E	11.7 (11.9)

PG601

1	C. FG(+)
2	C. FG(-)
3	FOWARD
4	GND
5	REWIND

To CAPSTAN MOTOR PG01M VIA CN01

PG602

1	HALL BIAS(+)
2	HALL BIAS(-)
3	TACH PULSE
4	CYL. FG(+)
5	CYL. FG(-)
6	E (+)
7	HALL BIAS(-)
8	E (-)
9	HALL BIAS(+)
10	12V/16V
11	L1
12	L2

To CYL.MOTOR PG481,PG482 PG483 VIA CN02

PG604

1	TRACKING 1
2	TRACKING 2
3	INPUT SELECT
4	NOR./ SELECT

To FUNCTION SWITCH PG9901 VIA CN604

PG607

2	A17V
1	GND

To HEATER CN07

PG605

1	A5.6V
2	A17V
3	AC CLOCK
4	GND
5	FH DET

To V.S TUNING PG706 VIA CN605

PG608

1	CTL PULSE
2	GND

To CONTROL HEAD PG08 VIA CN08

PG606

1	A17V
2	AC CLOCK
3	P. CONT
4	M. START
5	GND (M)
6	A12V
7	GND (S)
8	12V
9	12V/16V
10	———
11	A8V

To REGULATOR PG151 VIA CN151

IC601

9	10	11	12	13	14	15	16
-(-)	4.8(4.8)	-(-)	0(0)	0(0)	-(-)	2.5(2.5)	2.4(2.4)
8	7	6	5	4	3	2	1
0(0)	-(-)	4.3(4.3)	0(0)	0(0)	2.6(2.6)	2.7(2.7)	2.7(2.7)

IC602

8	10.6(10.6)
7	-(-)
6	0.5(0.5)
5	0(0)
4	0(0)
3	0.5(0.5)
2	-(-)
1	1.8(1.8)

IC603

12	0(0)
11	0(0)
10	10.6(10.6)
9	2.9(2.9)
8	2.9(2.9)
7	3.7(3.7)
6	11.5(11.6)
5	8.2(8.2)
4	5.2(5.2)
3	0.2(0.2)
2	0(0)
1	3.0(2.9)

IC604

42	-(-)	1	-(-)
41	-(-)	2	0(0)
40	4.8(4.8)	3	-(-)
39	0.3(-)	4	-(-)
38	0(0.3)	5	4.2(4.2)
37	-(-)	6	-(-)
36	0(0)	7	0(0)
35	-(-)	8	0(0)
34	0(0)	9	0(0)
33	0(0)	10	-(-)
32	0(2.3)	11	0(0)
31	-(-)	12	-(-)
30	2.5(2.5)	13	0(0)
29	0(0)	14	0(-)
28	-(-)	15	-(-)
27	-(-)	16	0(0)
26	2.3(2.3)	17	0(0)
25	2.2(2.2)	18	2.9(2.9)
24	2.6(2.6)	19	2.4(2.7)
23	2.3(2.3)	20	2.5(2.4)
22	-(-)	21	3.0(3.0)

IC6501

1	2	3	4	5	6	7	8
0 (0)	2.4(2.4)	2.4(2.4)	1.3 (1.3)	1.2 (1.2)	2.4(2.4)	- (-)	0 (0)
16	15	14	13	12	11	10	9
5.6 (5.6)	2.1 (2.1)	2.6(2.6)	2.7 (2.7)	1.6 (1.6)	2.4(2.4)	- (-)	3.7(3.7)

IC6502

14	5.6 (5.6)	1	0 (0)
13	0 (0)	2	0 (0)
12	0 (0)	3	- (-)
11	5.6 (5.6)	4	- (-)
10	0 (0)	5	0 (0)
9	5.6 (5.6)	6	0 (0)
8	5.2 (5.2)	7	0 (0)

IC605

1	2	3
5.6(5.6)	0(0)	9(9)

IC607

2	3	1
5.6 (5.6)	0 (0)	10.8(10.8)

IC606

1	2
10.8(10.8)	10.8(10.8)

Q601

B	0.6(0.6)
C	-(-)
E	0(0)

Q602

B	-(-)
C	-(-)
E	11.5 (11.5)

Q603

B	4.9(4.9)
C	5.6(5.6)
E	5.6(5.6)

QR605

B	4.1 (4.1)
C	0 (0)
E	0 (0)

Q607

B	11.4(12.3)
C	0 (12.1)
E	12.3(12.3)

Q608

B	2.5(0)
C	12.0(0)
E	12.1 (12.1)

Q611

B	9.4(9.4)
C	0(0)
E	4.8(4.8)

QR606

B	0 (0)
C	11.9 (11.9)
E	.0 (0)

Q612

B	3.0(3.0)
C	0(0)
E	2.9(2.9)

Q613

B	3.0(3.0)
C	3.7(3.7)
E	2.9(2.9)

Q614

B	0(0)
C	2.3(2.3)
E	0(0)

QR621

B	11.9 (11.9)
C	1.6 (1.6)
E	11.9 (11.9)

Q615

B	0(0)
C	2.3(2.3)
E	0(0)

Q618

B	1.8(1.8)
C	2.3(2.3)
E	2.4(2.4)

QR601

B	8.1(8.1)
C	0(0)
E	0(0)

QR623

B	11.9 (11.9)
C	0 (0)
E	0 (0)

QR602

B	-(-)
C	-(-)
E	0(0)

QR603

B	8.9(6.6)
C	12.3(0)
E	0(0)

QR604

B	8.9(0)
C	0(9.3)
E	0(0)

Q619

B	4.7(4.7)
C	0 (0)
E	0 (0)

QR610

B	0(0)
C	10.6(10.6)
E	0(0)

QR613

B	-(-)
C	-(-)
E	0(0)

QR616

B	11.9(0)
C	0(0)
E	0(0)

QR619

B	2.3(2.3)
C	2.3(2.3)
E	2.3(2.3)

Q6501

B	2.7(2.7)
C	2.1(2.1)
E	2.1(2.1)

Q6502

B	2.7(2.7)
C	2.1(2.1)
E	2.1(2.1)

PG901

1	A/D IN
2	GND

To
TOP SWITCH
PG8001
VIA
CN901

PG903

1	LOAD
2	UNLOAD

To
LOADING MOTOR
PG03
VIA
CN03

PG904

1	CST DOWN
2	CST UP
3	CST LOAD
4	CST UNLOAD
5	AIOV
6	FWD END
7	REW END

To
CASSETTE
LOADING MOTOR
PG04
VIA
CN04

PG905

1	A12V
2	T. REEL
3	GND
4	GND
5	REVERSE
6	REC/PLAY
7	PAUSE
8	F.FWD/REW
9	STOP
10	AIOV
11	SAFETY TAB

To
TAKE-UP
REEL SENSOR/
MECHA STATE
SWITCH/
SAFETY TAB
SWITCH
CN05

PG906

1	END LAMP
2	GND

To
END LAMP
CN06

PG907

1	MEMORY STOP
2	DATA (S-T)
3	DATA (T-S)
4	REEL
5	CLOCK (S-T)

To
TIMER
PG107
VIA
CN107

PG926

1	DEW SENSOR
2	AIOV

To
DEW SENSOR

IC901

64	0(0)	1	10.4(10.4)
63	0(10.4)	2	10.4(10.4)
62	10.4(0)	3	10.4(10.4)
61	0(0)	4	0(0)
60	0(0)	5	10.3(0)
59	0(0)	6	0(0)
58	-(-)	7	-(-)
57	-(-)	8	-(-)
56	-(-)	9	-(-)
55	0(0)	10	0(0)
54	10.2(10.2)	11	0(0)
53	0(0)	12	0(0)
52	0(0)	13	10.3(10.3)
51	10.4(10.4)	14	0(10.0)
50	9.6(9.6)	15	10.0(10.0)
49	-(-)	16	9.8(9.8)
48	-(-)	17	9.8(9.8)
47	-(-)	18	9.8(9.8)
46	10.0(10.0)	19	0(0)
45	0(0)	20	10.5(10.5)
44	0(0)	21	0(0)
43	0(0)	22	0(0)
42	0(0)	23	0(0)
41	0(0)	24	0(0)
40	-(-)	25	-(-)
39	-(-)	26	0(0)
38	10.5(10.5)	27	0(0)
37	0(0)	28	0(0)
36	0.5(0.5)	29	10(10)
35	0.5(0.5)	30	-(-)
34	10.4(10.4)	31	10.4(10.4)
33	10.5(10.5)	32	10.4(10.4)

IC902

1	0(0)
2	9.7(9.7)
3	11.9(11.9)
4	0(0)
5	0(0)
6	-(-)
7	-(-)
8	-(-)
9	0(0)
10	11.9(11.9)
11	9.7(9.7)
12	0(0)

IC903

10	10.4(10.4)
9	-(-)
8	4.2(4.2)
7	0(0)
6	9.8(9.8)
5	4.2(4.2)
4	-(-)
3	-(-)
2	-(-)
1	0(0)

Q901

B	0.7(0.7)
C	0(0)
E	0(0)

QR903

B	-(-)
C	10.4(10.4)
E	0 (0)

QR904

B	3.2(3.2)
C	0(0)
E	0(0)

QR905

B	0(10.4)
C	0(0)
E	0(0)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

MAIN PCB

JACK SECTION

RT501 E-E AUDIO LEVEL

RT603 H. JITTER

RT601 HEAD SWITCHING POINT

R651, R652 REFERENCE OSCILLATION FREQUENCY

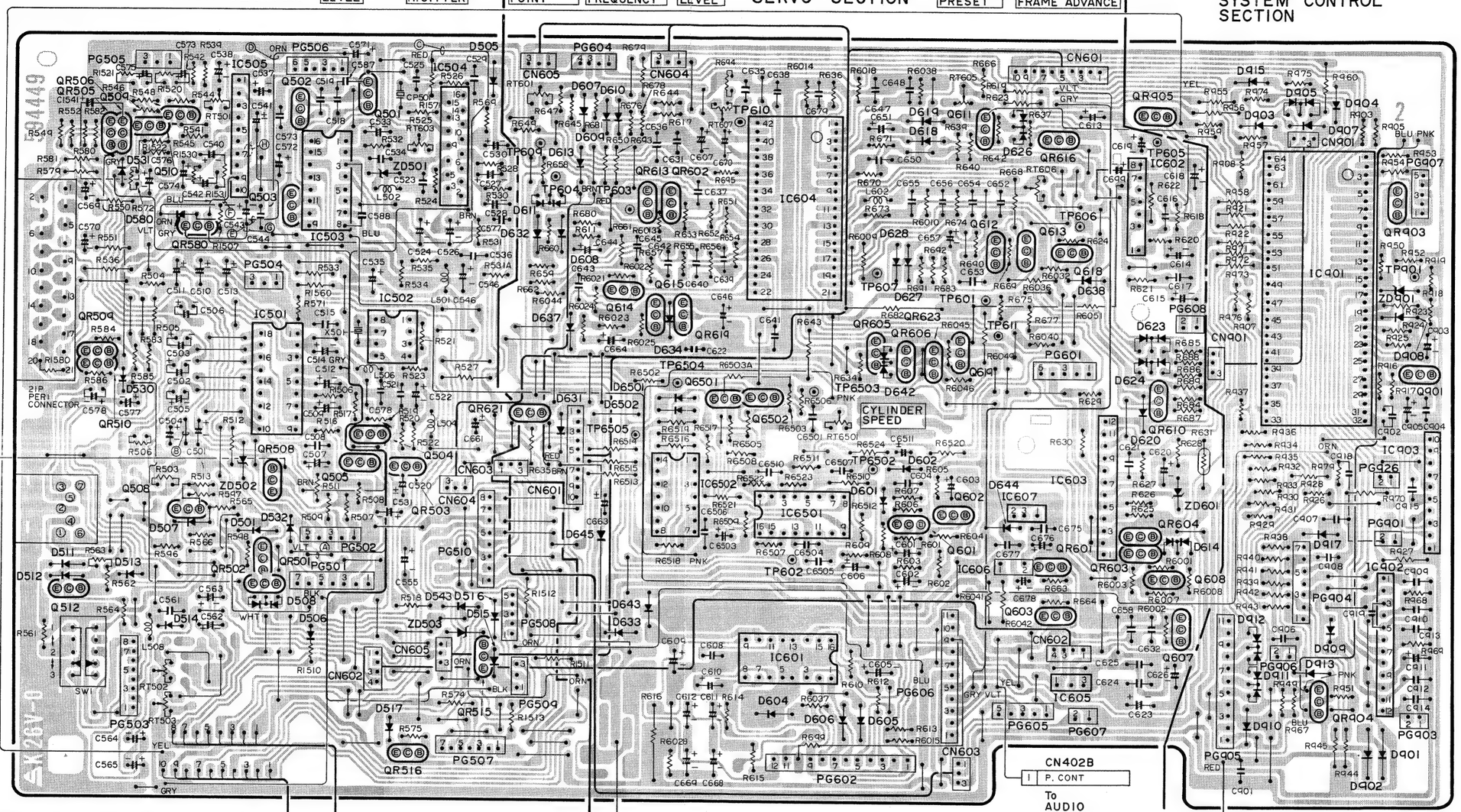
RT607 H. SYNC LEVEL

SERVO SECTION

RT605 TRACKING PRESET

RT606 FRAME ADVANCE

SYSTEM CONTROL SECTION



2IP PERI CONNECTOR

1	AUDIO OUT	2	AUDIO IN
3	AUDIO OUT	4	GND
5	—	6	AUDIO IN
7	—	8	
9	—	10	—
11	—	12	—
13	—	14	—
15	—	16	
17	GND	18	
19	VIDEO OUT	20	VIDEO IN
21	GND		

CN055

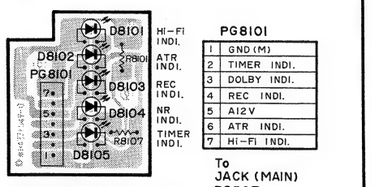
MUTE	1

To DEMODULATOR CN1804

DIN JACK

RT502 L-CH LEVEL INDICATOR

RT503 R-CH LEVEL INDICATOR



PG8101

1	GND (M)
2	TIMER INDI.
3	DOLBY INDI.
4	REC INDI.
5	AI2V
6	ATR INDI.
7	HI-FI INDI.

To JACK (MAIN) PG507 VIA CN507

INDICATOR P.C.B

VHS91 INDICATOR BOARD (1/2)

CND501

1	SYNC
2	ATR
3	SW25Hz
4	ADD. V
5	—
6	—
7	4.43 MHz
8	GND
9	12V
10	TRICK PLAY

To Y/CHROMA PG202

CND502

1	REC 5V
2	MUTE
3	REC 9V
4	VIDEO
5	GND
6	VIDEO
7	TSG
8	PB12V

To Y/CHROMA PG203

CN404B

1	ADD. V

To AUDIO CN404A

CN402B

1	P. CONT

To AUDIO CN402A

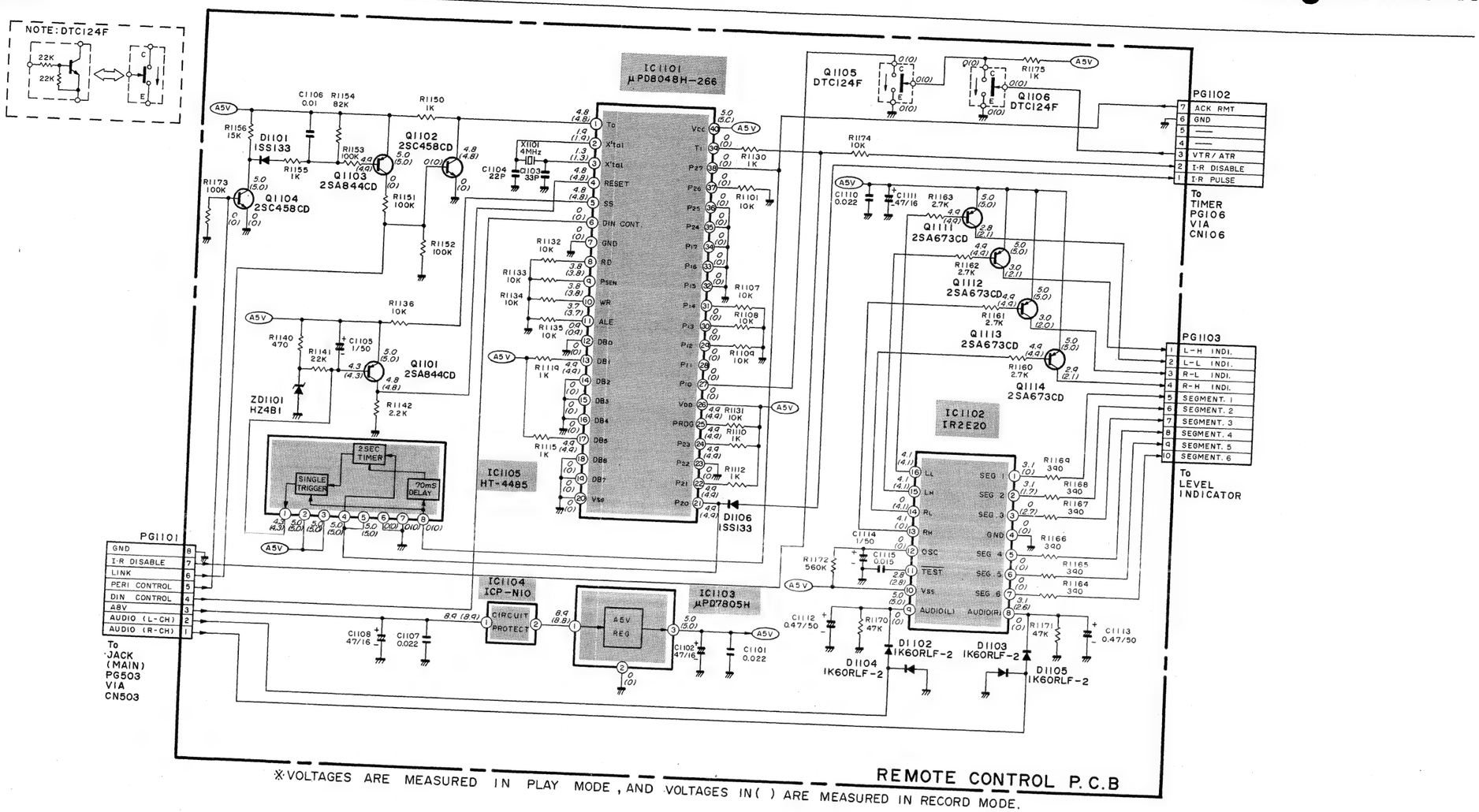
CN403B

1	AI2V

To AUDIO CN403A

MAIN P.C.B

VHS 91 MAIN BOARD (1/2)



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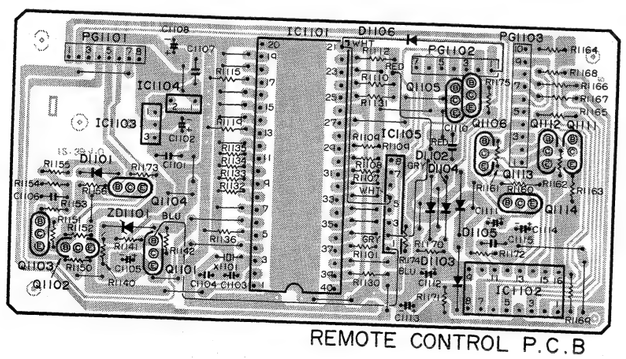
REMOTE CONTROL P.C.B

VHS91 REMOTE CONTROL SCHEMATIC

REMOTE CONTROL PCB



REMOTE CONTROL P.C.B

IC1101

20	0 (0)	21	4.9 (4.9)		
19	0 (0)	22	4.9 (4.9)		
18	0 (0)	23	0 (0)		
17	4.9 (4.9)	24	4.9 (4.9)		
16	0 (0)	25	4.9 (4.9)		
15	0 (0)	26	4.9 (4.9)		
14	0 (0)	27	0 (0)		
13	4.9 (4.9)	28	0 (0)		
12	0 (0)	29	0 (0)		
11	0.9 (0.9)	30	0 (0)		
10	3.7 (3.7)	31	0 (0)		
9	3.8 (3.8)	32	0 (0)		
8	3.8 (3.8)	33	0 (0)		
7	0 (0)	34	0 (0)		
6	0 (0)	35	0 (0)		
5	4.8 (4.8)	36	0 (0)		
4	4.8 (4.8)	37	0 (0)		
3	1.3 (1.3)	38	0 (0)		
2	1.9 (1.9)	39	0 (0)		
1	4.8 (4.8)	40	5.0 (5.0)		

Q1101

B	4.3 (4.3)
C	4.8 (4.8)
E	5.0 (5.0)

Q1102

B	0 (0)
C	4.8 (4.8)
E	0 (0)

Q1103

B	4.9 (4.9)
C	0 (0)
E	5.0 (5.0)

Q1104

B	0 (0)
C	5.0 (5.0)
E	0 (0)

Q1105

B	0 (0)
C	0 (0)
E	0 (0)

Q1106

B	0 (0)
C	0 (0)
E	0 (0)

Q1111

B	4.9 (4.9)
C	2.8 (2.1)
E	5.0 (5.0)

Q1112

B	4.9 (4.9)
C	3.0 (2.1)
E	5.0 (5.0)

Q1113

B	4.9 (4.9)
C	3.0 (2.0)
E	5.0 (5.0)

Q1114

B	4.9 (4.9)
C	2.9 (2.1)
E	5.0 (5.0)

PG1101

1	AUDIO (R-CH)
2	AUDIO (L-CH)
3	A8V
4	DIN CONTROL
5	PERI CONTROL
6	LINK
7	I-R DISABLE
8	GND

To JACK (MAIN) PG503 VIA CN503

PG1102

1	I-R PULSE
2	I-R DISABLE
3	VTR/ATR
4	VTR/ATR
5	A5V
6	GND
7	ACK RMT

To TIMER PG106 VIA CN106

PG1103

1	L-H INDI.
2	L-L INDI.
3	R-L INDI.
4	R-H INDI.
5	SEGMENT-1
6	SEGMENT-2
7	SEGMENT-3
8	SEGMENT-4
9	SEGMENT-5
10	SEGMENT-6

To LEVEL INDICATOR

IC1102

9	10	11	12	13	14	15	16
0 (0)	5.0 (5.0)	2.8 (2.8)	0 (0)	4.1 (0)	0 (4.1)	4.1 (4.1)	4.1 (4.1)
8	7	6	5	4	3	2	1
0 (0)	3.1 (2.6)	0 (0)	0 (0)	0 (0)	0 (2.7)	3.1 (1.7)	3.1 (0)

IC1103

1	8.9 (8.8)
2	0 (0)
3	5.0 (5.0)

IC1104

1	2
8.9 (8.8)	8.9 (8.8)

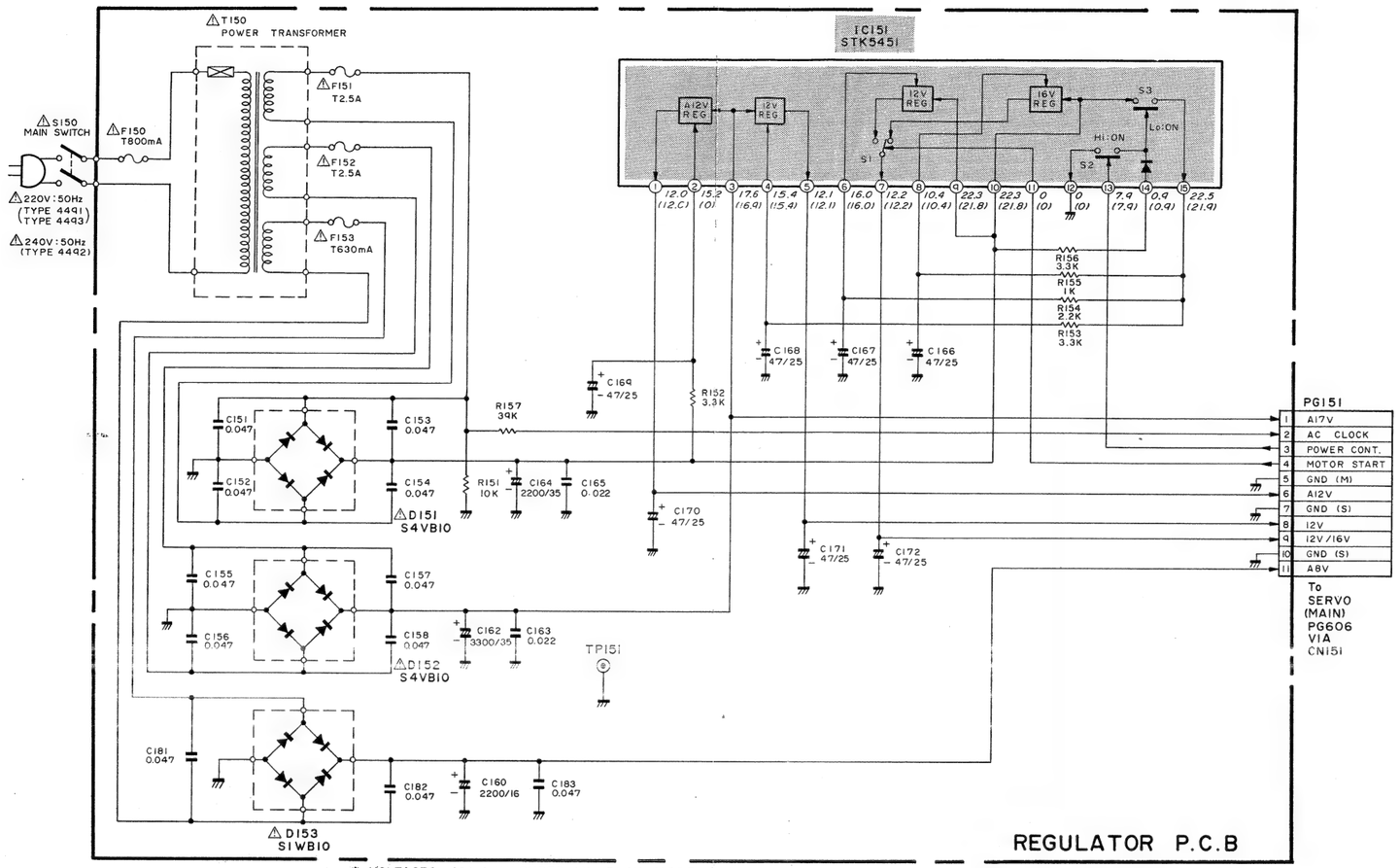
IC1105

8	0 (0)
7	0 (0)
6	0 (0)
5	5.0 (5.0)
4	5.0 (5.0)
3	5.0 (5.0)
2	5.0 (5.0)
1	4.3 (4.3)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 REMOTE CONTROL BOARD (2/2)

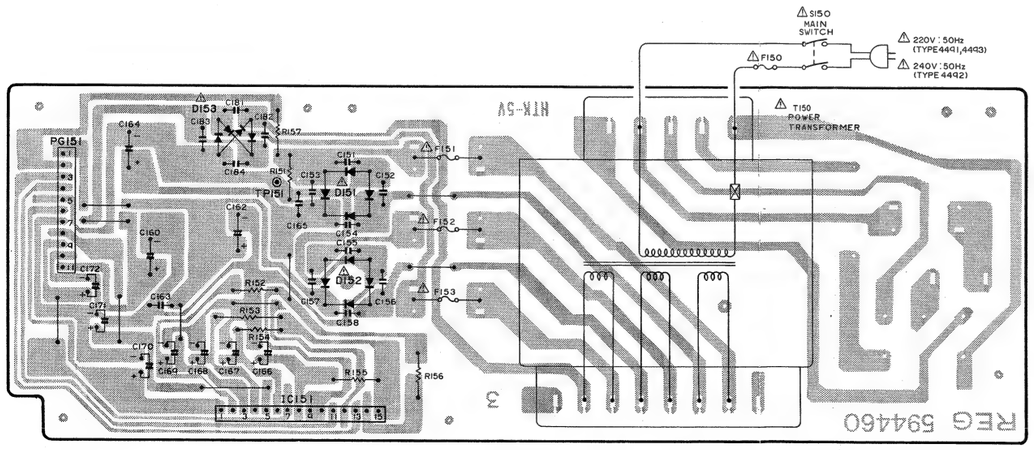
REGULATOR REG 8004589



※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 REGULATOR SCHEMATIC

REGULATOR PCB



REGULATOR P.C.B

PG151	
1	A17V
2	AC CLOCK
3	POWER CONT.
4	MOTOR START
5	GND (M)
6	A12V
7	GND (S)
8	12V
9	12V/16V
10	GND (S)
11	A8V

To SERVO (MAIN) PG606 VIA CN151

IC151

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
12.0(12.0)	15.2 (0)	17.6(16.9)	15.4(15.4)	12.1(12.1)	16.0(16.0)	12.2(12.2)	10.4(10.4)	22.3(21.8)	22.3(21.8)	0 (0)	0 (0)	7.9 (7.9)	0.9 (0.9)	22.5(21.9)

※ VOLTAGES ARE MEASURED IN PLAY MODE, AND VOLTAGES IN ( ) ARE MEASURED IN RECORD MODE.

VHS91 REGULATOR BOARD (1/2)

LIST OF ELECTRICAL PARTS

Parts not mentioned are standard

8004538
Tuner/IF Block BS
Type 4492

Tuner IF block 8004538 is a single unit, and consists of: UHF tuner, IF and booster.
With failure in this block we recommend replacing.
PAL I

8004595
Tuner/IF Block CT
Type 4493

Tuner IF block 8004595 is a single unit, and consists of: VHF/UHF tuner, IF and booster.
With failure in this block we recommend replacing.
PAL B G S-tuner.

8004540
Tuner/IF Block H
Type 4491

Tuner IF block 8004540 is a single unit, and consists of: VHF/UHF tuner, IF and booster.
With failure in this block we recommend replacing.
PAL B G

8504541
RF Converter
Type 4492

RF Converter 8004541 is a single unit.With failure in this block we recommend replacing.
PAL I

8004542
RF Converter
Type 4491
Type 4493

RF Converter 8004542 is a single unit.With failure in this block we recommend replacing.
PAL B G and PAL B G S-tuner.

8004546
Top Switch

Thick film	R1102	5030022	RA: 8001
Switch	Micro	7400268	S: 8001, 8002, 8003, 8004, 8005, 8006, 8007, 8008

8004549
Infrared Receiver INF
Type 4491 H
Type 4492 BS
Type 4493 CT

Filter	38 KHz bypass	8020497	LO: 051
Diode IR	Infrared PH 302	8030130	PD: 051
IC	µPC 1473HA	8340879	IC: 051

8004576
Y-Chroma WYC
Type 4492 BS

Safe Resistor	68Ω 1W	5020797	R: 238, 246
Var. Resistor	1kΩ	5370279	RT: 201, 202
Delay	Delay EQ	6240023	CP: 206
	1H Delay	6240015	CP: 204
	2h Delay	6240024	CP: 207
Switch	3 pos.	7400337	S: 201
Coils	12 mH	8020498	L: 220
	10 µH	8020487	L: 217, 219
	15 µH	8020615	L: 209
	27 µH	8020501	L: 216
	33 µH	8020620	L: 202, 215, 218
	39 µH	8020614	L: 208
	39 µH	8020489	L: 221
	39 µH	8020618	L: 243
	56 µH	8020624	L: 242
	100 µH	8020613	L: 206, 207
	330 µH	8020499	L: 201, 223

	Filter	1.5 MHz HPF	8030109	CP: 202
		4.43 MHz BPF	8030102	CP: 208
		5 MHz Peaking	8030100	CP: 203
	Z-Diode	HZ 6A 2	8300528	ZD: 351
	Diode	DAN 201	8300440	D: 203
		1SS 106	8300524	D: 205, 206, 207
		1SS 133	8300439	D: 202, 204, 208, 211, 352
	Transistor stage	DTC 124F	8320585	Q: 203
	Transistor	2SA 844D	8320584	Q: 214
		2SC 458	8320677	Q: 201, 209
		2SC 535C	8320678	Q: 208
		2SC 2021S	8320590	Q: 202, 203, 205, 206, 207, 212, 213, 220
	IC	HA 11797	8340869	IC: 201
	Thickfilm	HT 4507A	8350046	IC: 202
		HT 4509B	8350047	IC: 203
8004577 **Y-Chroma WYC** **Type 4491 H** **Type 4493 CT**	**Safe Resistor**	68Ω 1W	5020797	R: 238, 246
	Var. Resistor	470Ω	5370344	RT: 351
		1KΩ	5370279	RT: 201, 202
	Delay	Delay EQ	6240023	CP: 206
		1H Delay	6240015	CP: 204
		2h Delay	6240024	CP: 207
	Switch	3 pos.	7400337	S: 201
	Coils	Trap	8020622	L: 351
		12mH	8020498	L: 220
		10 µH	8020487	L: 217, 219
		15 µH	8020615	L: 209
		27 µH	8020501	L: 216
		27 µH	8020612	L: 353
		33 µH	8020620	L: 202, 215, 218
		39 µH	8020614	L: 208
		39 µH	8020489	L: 221
		39 µH	8020618	L: 243
		56 µH	8020624	L: 242
		100 µH	8020613	L: 206, 207
		330 µH	8020499	L: 201, 223
	Filter	1.5 MHz H P F	8013109	CP: 202
		4.43 MHz BPF	8030102	CP: 208
		4.5 MHz Filter	8030098	CP: 351
		5 MHz Peaking	8030100	CP: 203
	Z-Diode	HZ 6A 2	8300528	ZD: 351
	Diode	DAN 201	8300440	C: 203
		1SS 106	8300524	D: 205, 206, 207
		1SS 133	8300439	D: 202, 204, 208, 211, 351, 352, 354
	Transistor stage	DTC 124F	8320585	Q: 203

	Transistor	2SA 844D	8320584	Q: 214
		2SC 458	8320677	Q: 201, 209
		2SC 535C	8320678	Q: 208
		2SC 2021 S	8320590	Q: 202, 203, 205, 206, 207, 212, 213, 220
	IC	BA 7025L	8340870	IC: 351
		HA 11797	8340869	IC: 201
	Thickfilm	HT 4507A	8350046	IC: 202
		HT 4509B	8350047	IC: 203
8004578				
MAIN PCB	**Plug Panel**	Scart/DIN	3168685	
Servo/Jack/				
System Control	**Resistor**	150 Ω /1W	5100229	R: 682
JSS				
Servo	**PTC**	4.7Ω	5230017	R: 631, 699
Type 4492 BS				
	Var. resiator	10 KΩ	5370271	RT: 501, 502, 503
		100 KΩ	5370292	RT: 601, 603
		220 KΩ	5370276	RT: 605, 606, 6501
		470 KΩ	5370345	RT: 607
8004579	**Switches**	3 pos.	7400344	SW: 1
MAIN PCB				
Servo/Jack/	**Rec. prevention switch**		7400306	S: 141
System Control				
JSS	**Mechanical state swich**		7400307	S: 142
Servo				
Type 4493 CT	**Cassette down switch**		7400345	S: 143
8004606				
MAIN PCB	**Cassette up swich**		7400345	S: 144
Servo/Jack				
System Control				
JSS	**Coil**	10µH	8020487	L: 508
Servo		100µH	8020491	L: 504
Type 4491 H		220µH	8020488	L: 501, 502
		470µH	8020492	L: 506
		820µH	8020485	L: 602
	Crystal	500 KHz	8030099	CP: 501
		3,58 MHz	8090032	X: 502
	Diode	DAN 201	8300440	D: 508, 611, 614, 623, 624, 626, 905, 911, 912
		DS 135D-FA3	8300452	D: 901, 902
		1SS 106	8300524	D: 580
		1SS 133	8300439	D: 501, 505, 506, 507, 511, 512, 513, 514, 515, 516, 517, 530, 531, 532, 543, 601, 602, 604, 605, 606, 607, 608, 609, 610, 613, 618, 619, 620, 627, 628, 631, 632, 634, 637, 638, 643, 644, 645, 903, 904, 907, 908, 909, 910, 913, 915, 917 6501, 6502
	Z-Diode	HZ 9A2	8300453	ZD: 601, 901
		HZ 5C3	8300525	ZD: 501
		HZ-6B2	8300536	ZD: 502
		HZ 9A2	8300453	ZD: 503

Transistor stage	DTA 124F	8320608	QR:	501, 515, 516, 619, 621
	DTC 124F	8320585	QR:	502, 503, 507, 508, 580, 601, 602, 603, 604, 605, 606, 610, 613, 616, 623, 903, 904, 905
	DTC 144F	8320686	QR:	505, 506, 509, 510
Transistor	2SA 673C	8320675	Q:	603
	2SA 673C-TB	8320688	Q:	608
	2SA 844	8320681	Q:	508, 512
	2SA 844CD-TB	8320687	Q:	602, 611, 612, 618, 619
	2SA 952ML2	8320593	Q:	607
	2SC 458	8320674	Q:	504, 505, 509, 510, 601, 615, 901, 6501, 6502
	2SC 458-TB	8320677	Q:	613, 614
	2SD 468	8320676	Q:	501, 502, 503
End lamp	GL 450	8330173	D:	141
Supply end sensor	PT 23F	8330176	Q:	141
Take-up end sensor	PT 23F-HLD	8330177	Q:	142
Take up reel sensor	DN 6838	8340882	IC:	141
IC	BA 340	8340635	IC:	602
	BA 6303	8340897	IC:	6501
	BU 4011B	8340478	IC:	6502
	EWA 127	8340871	IC:	503
	HA 1340A	8340873	IC:	601
	HA 11843	8340881	IC:	604
	HD 38820L36	8340875	IC:	901
	ICP-N5	8340895	IC:	606
	LA 7215	8340872	IC:	504
	MSM 5258RS	8340706	IC:	502
	M51321P	8340695	IC:	501
	M5278Ll-56	8340702	IC:	605
	M54548L	8340874	IC:	603
	M5449L-A	8340876	IC:	902
	TA 4398A	8340877	IC:	903
	µPC 780SH	8340898	IC:	607
Thickfilm	HT4460	8350051	IC:	505

8004580 Audio AUD

Safe Resistor	22Ω 1/4 W	5020386	R:	441
	47Ω 1/4 W	5020757	R:	442
Var. Resistor	1KΩ	5370279	RT:	4501 R, 4501L
	10 KΩ	5370271	RT:	402 R, 402 L, 403 R, 403 L
	22 KΩ	5370282	RT:	4504 R, 4504 L
	47 KΩ	5370270	RT:	401 R, 401 L, 4502
	220 KΩ	5370348	RT:	404 R, 404 L, 4503
Coils	15mH	8020483	L:	402 R, 402 L
	100µH	8020491	L:	4501, 4502, 4505
	470µH	8020492	L:	4503, 4504
	820µH	8020546	L:	404
	Filter Block	8020484	L:	403 R, 403 L
Osc. Coil	Erase Osc.	8020623	CP:	401
Filter	MPX L P F	8030103	F:	451 R, 451 L
	20 KHz L P F	8030106	F:	4502 R, 4502 L
	1.4MHz B P F	8030105	F:	4501 L
	1.8MHz B P F	8030107	F:	4501 R

Crystal	1MHz	8030104	CE: 471
	Trap Coil	8030068	L: 401 R, 401 L
Diode	1SS 133	8300439	D: 472, 474, 475, 476, 493, 4501 L, 4501 R, 4502 L, 4502 R, 4504, 4505, 4506, 4507
Z-Diode	HZ 4B1	8300523	ZD: 471
	HZ 5C3	8300525	ZD: 472
Transistor	2SA 673	8320675	Q: 401
	2SA 844	8320584	Q: 471
	2SC 458	8320674	Q: 4503, 4506, 4507
	2SC 1741	8320614	Q: 4504, 4505
	2SC 2021	8320583	Q: 4501, 4502, 4508 R, 4508 L
Transistor Stage	DTC 124F	8320585	QR: 401, 402, 403, 451, 471, 472, 4501, 4502, 4503
IC	BA 5112LS	8340631	IC: 401 R, 401 L
	D4066SIP	8340699	IC: 403
	HA 12072AN	8340908	IC: 4503
	M 50760 67OP	8340888	IC: 471
	M 5241L	8340905	IC: 451
	NJM 4558 S	8340891	IC: 4504
	TA 7324P	8340907	IC: 472
	TA 7361AP	8340887	IC: 405 R, 405 L
	TA 7772P	8340909	IC: 4501
	TK 15021Z	8340906	IC: 452
Thickfilm	HT 3013	8350048	IC: 402
	HT 6212	8350050	IC: 5402

8004581
Demodulator
DEM
Type 4493 CT

Safety res.	22Ω 1/4W	5020144	R: 1801
Var. res.	10kΩ	5370275	RT: 1801, 1802
	10kΩ	5370271	RT: 1807, 1808
	100kΩ	5370292	RT: 1803
	220kΩ	5370276	RT: 1804
	470kΩ	5370345	RT: 1805
Coils	12μH	8020629	L: 1801
	15μH	8020628	L: 1802
Filter	5.5 MHz	8030114	CF: 1802
	5.74 MHz	8030115	CF: 1801
	Aud. Detection	8030113	CF: 1803
Filter	Aud. Detection	8030112	CP: 1801
	Filter	8030066	CP: 1802
	Aud. Detection	8030112	CP: 1803
Diode	1SS 133	8300538	D: 1801
	1SS 133	8300439	D: 1802, 1803
Z-Diode	Hz 9A	8300543	ZD: 1801
Transistor	2SA 673C	8320675	Q: 1803
	2SC 2021RS	8320590	Q: 1801, 1804, 1805, 1806, 1807R, 1807L

	Trans. Stage	DTC 124F	8320585	QR: 1802
	IC	BA 4560	8340738	IC: 1802
		IR 3P02	8340922	IC: 1801
8004582 Remote Control RMT	Crystal	4MHz	8090059	X: 1101
	Z-Diode	HZ 4B1	8300523	ZD: 1101
	Diode	1K 60RLF 2	8300537	D: 1102, 1103, 1104, 1105
		1SS 133	8300439	D: 1101
	Transistor	2SA 673C	8320675	Q: 1111, 1112, 1113, 1114
		2SA 844CD	8320584	Q: 1101, 1103
		2SC 458C	8320674	Q: 1102, 1104
	Transistor stage	DTC 124F	8320585	Q: 1105, 1106
	IC	IR 2E 20	8340904	IC: 1102
		ICP N10	8340894	IC: 1104
		µPD 7805H	8340898	IC: 1103
		µPD 8048H 266	8340820	IC: 1101
8004583 Function FSW	Potentiometer	20 Kohm Rec. level	5300127	RV: 9901
		500 Kohm Tracking	5300032	RV: 9902
	Switch	Micro	7400299	S: 9902, 9905, 9906, 9907, 9910, 9911, 9912, 9913, 9914, 9915, 9916, 9917, 9918, 9919, 9920, 9921, 9922, 9923
		2pos.	7400301	S: 9909
		3pos.	7400300	S: 9903, 9908
	Diode	1SS 133	8300439	D: 9901
	IC	M50761-673SP	8340883	IC: 9901
		PST 520F	8340878	IC: 9902
8004584 Indicator IND	LED	SLR-34URS	8330001	D: 8101, 8102, 8103, 8104, 8105
8004585 TIM Timer Type 4491 H Type 4492 BS	Var. Cap.	20pF	4340921	C: 211
	Crystal	32 kHz	8090042	X: 101
8004586 TIM Timer Type 4493 CT	Diode	1SS 133	8300439	D: 107, 108, 111, 112, 113, 114
	Z-Diode	4R7 JB1-2	8300527	ZD: 101
	Transistor	2SA 844 CD	8320681	Q: 103
		2SC 2021RS	8320583	Q: 101, 102
	Display	10-BT-17ZK	8330172	DG: 101
	IC	M50752-686SP	8340889	IC: 101

8004587
V-S Tuning
Type 4492 BS

Coil	Osc. coil	8020610	L: 701
	100 µH	8020491	L: 702
Crystal	4 MHz	8030097	CE: 701
Z-Diode	Hz 3B	8300531	CD: 704
	Hz 4B1	8300523	ZD: 701
	Hz 5A1	8300459	ZD: 706
	Hz 15	8300458	ZD: 709, 710
	Hz 9C2	8300450	ZD: 703
	µPC 574J	8300460	ZD: 705
Diode	1SS 81	8300529	D: 704, 711
	1SS 133	8300439	D: 702, 703, 705, 706, 707, 710, 714, 717
Transistor	2SA 844CD	8320584	Q: 702
	2SC 458CD	8320674	Q: 701, 703, 704, 706, 707
	2SD 1266A	8320673	Q: 705
Transistor Stage	DTC 124ES	8320680	QR: 701, 703
	DTA 124F	8320608	QR: 702
IC	M50161-257SP	8340868	IC: 701
	M58653P	8340648	IC: 702

8004588
V-S Tuning
Type 4491 H
Type 4493 CT

Fuse Res.	3.3Ω 1/4W	5020678	R: 745
Coil	Osc. coil	8020610	L: 701
	100µH	8020491	L: 702
Crystal	4 MHz	8030097	CE: 701
Z-Diode	Hz 3B	8300531	ZD: 704
	Hz 4B1	8300523	ZD: 701
	Hz 5A1	8300459	ZD: 706
	Hz 9C2	8300450	ZD: 703
	Hz 15	8300458	ZD: 709, 710
	µPC 574J	8300460	ZD: 705
Diode	1SS 81	8300529	D: 704, 711
	1SS 133	8300439	D: 701, 702, 703, 704, 705, 706, 707, 710, 713, 714, 717
Transistor	2SA 844CD	8320584	Q: 702
	2SC 458CD	8320674	Q: 701, 703, 704, 706, 707
	2SD 1266A	8320673	Q: 705
Transistor Stage	DTA 124F	8320608	QR: 702
	DTC 124ES	8320680	QR: 701, 703
IC	LA 7910	8340654	IC: 703
	M50161-257SP	8340868	IC: 701
	M58653P	8340648	IC: 702

8004589
Regulator REG

Mains cord	Type 4491, 4493	6271102	
	Type 4492	6271022	
Fuses	630mA/T Slow	6600005	F: 153
	800mA/T Slow	6600011	F: 150
	2.5A/T Slow	6600020	F: 151, 152
Switch	Mains	7450067	S: 150
Transformer	220V/50Hz		
	Type 4491, 4493	8013380	T: 150
	240V/50Hz 4492	8013381	T: 150
Diode	S4VB10	8300445	D: 151, 152, 153
IC	STK 5451	8340867	IC: 151

MECHANICAL PARTS LIST

0101	3164624	Top cover
0101	3164646	Top cover White
0102	3454437	Bottom cover
0103	3103236	Felt
0104	3103237	Felt
0105	3168671	Left panel
0105	3168689	Left panel White
0106	3168670	Right panel
0106	3168688	Right panel White
0107	3168682	Front Panel top
0108	3168692	Aluminium profile
	3168681	Operating panel with buttons Type 4491
	3168695	Operating panel with buttons Type 4492
	3168694	Operating panel with buttons Type 4493
0109	3164626	Cassette door
0110	2819220	Spring
0114	2548226	Bracket
0115	2776051	Buttons Primary function
0116	2548227	Bracket
0120	3302420	Screen plate
0122	3907057	Rubber cushion
0125	3164563	Fuse cover
0126	3168672	Rail section botton
0127	2755030	Damping mechanism
0129	2776067	Knop tracking
0130	3112318	Bracket
0131	2391058	Bushing
0132	8013380	Mains transformer 220 Volt
	8013381	Mains transformer 240 Volt
0134	3164564	Switch cover
0135	7200016	Fuse Holder
0136	7450067	Mains Swich
0138	3168685	Jack plate
0146	6600020	Fuse 2.5A/T Slow
0147	6600005	Fuse 630mA/T Slow
0150	6600011	Fuse 800mA/T Slow
0155	3164625	Cover for heatzink
0158	6271022	Mains cable Type 4492
	6271102	Mains cable Type 4491/-93
0202	2726141	Supply rell assembly
0203	2726138	Take-up rell assembly
0204	3152522	IC holder
0206	2622372	Washer
0207	2622371	Polyslide washer
0208	2854065	Brake arm
0209	2854111	Tension arm
0210	2938221	Brake L
0211	2938222	Brake R
0212	2810176	Spring
0213	2810175	Spring
0214	2816211	Tension band
0215	3152448	BT spring holder
0216	2854124	Arm bracket
0217	2794108	Idler wheel
0218	2854102	Loading link R assembly
0219	2854103	Loading link L assembly
0220	2854101	Guide roller base
0221	2854109	Guide roller base
0224	3015124	Guide roller
0225	3015125	Guide roller
0226	3014079	Guide base holder
0229	3016000	Tape guide
0230	2812102	Spring
0231	2854096	Impedance arm assembly
0232	8600082	F E Head
0233	2810179	Spring
0234	8600098	Audio control head
0235	2812103	Spring
0236	2622015	Washer
0237	2854107	Sub brake
0238	2810177	Spring
0239	8400161	Capstan motor
0240	2854090	Recordinng prevention arm
0241	7400306	Switch
0242	2622373	Polyside washer
	2854100	Pressure roller arm
0243	2804057	Pressure roller assembly
0246	2819200	Spring
0247	2380137	X-adjust screw
0248	7400307	Mech. state switch
0252	3458420	Cap
0255	2576193	Collar
0256	2819219	Spring
0301	3112319	Clutch plate assembly
0302	2732069	Belt
0303	3013052	Brake slider
0304	2854094	Mode slider
0305	2819202	Spring
0306	2755028	Loading gear assembly
0307	2854095	Tension arm
0311	8400154	Loading motor assembly
0312	2732075	Belt
0313	2732071	Belt
0314	2794109	Flywheel
0315	2622375	Polyside washer
0316	2622374	Washer
0317	2732072	Belt
0318	2732077	Belt
0319	3152427	Flywheel holder
0320	2722030	Pulley
0321	2622371	Polyslider washer
0322	2732069	Belt
0323	5230016	Heater
0401	2755029	Front loading assembly
0404	8054108	Cassette holder
0412	2755026	Motor block assembly
0414	8400152	Front motor assembly
0417	2700057	Loading gear assembly R
0423	2700056	Loading gear assembly L
0424	3454436	Plate
0425	3454435	Holder
0426	2700055	Holder link assembly
0427	2854123	Door arm
0428	2810210	Spring
0501	8600097	Upper and lower cylinder
0503	2819199	Spring
0504	8013385	Stator
0505	3356049	Magnet
0507	8004602	Tachopulse sensor PCB

0901	2013099	Screw
0903	2013080	Screw
0906	2013099	Screw
0908	2013099	Screw
0922	2013080	Screw
0927	2013099	Screw
0928	2013080	Screw
0929	2039028	Screw
0930	2013099	Screw
0951	2013119	3 x 8mm Bind tapping screw
0952	2013119	3 x 8mm Bind tapping screw
0954	2013119	3 x 8mm Bind tapping screw
0955	2013119	3 x 8mm Bind tapping screw
0956	2013119	3 x 8mm Bind tapping screw
0958	2013119	3 x 8mm Bind tapping screw
0959	2072909	Screw to tape guide
0960	2013119	3 x 8mm Bind tapping screw
0961	2036015	2.6 x 5mm Screw
0962	2039058	3 x 12mm with spring washer
0963	2380136	3mm nut
0964	2034044	2 x 3mm Screw
0965	2039028	3 x 8mm Screw
0966	2070035	Screw
0967	2039059	3 x 14 mm Screw
0968	2380136	3mm nut
0969	2013119	3 x 8mm Bind tapping screw
0970	2013119	3 x 8mm Bind tapping screw
0971	2013119	3 x 8mm Bind tapping screw
0976	2013120	3 x 8mm screw
0977	2013119	3 x 8mm Bind tapping screw
0978	2039066	3 x 12mm with spring washer
0988	2013202	3 x 10mm Screw
0990	2013080	3 x 6mm Screw

Parts not shown

6270285 Cable 21 pin to 21 pin
6271134 Antenne Cable
6270290 Antenne Cable UK
6270284 21/6 pol A/V Box
6270277 Cable 21 pol to 6 pol
6270222 Cable DIN 7 pol to 7 pol

6270236 Cable 2 phono male to 2 phono male
6270215 Cable 4 phono male to 5 pole DIN male
3397596 Cushion upper/lower
3391900 Carton box
3390248 Soft sock

Operating Manual

3504318 Danish
3504319 Swedish
3504320 Finnish
3504321 English
3504322 German

3504323 Dutch
3504324 French

Video Stand for VHS 91

8930686 Video Stand Type 3068 for Beovision Type 33xx, Type 7xxx and VHS 91
8930706 Video Stand Type 3070 for Beovision 31xx 20" and VHS 91.

For further information, see Accessories 1. Service Manual 3538599

Servicing Tools

6780094 Back tension meter
6780093 Allignment tape (PAL)
6780100 Testcassette for x-position
3621027 Torque gauge
3014064 Torque gauge adaptor

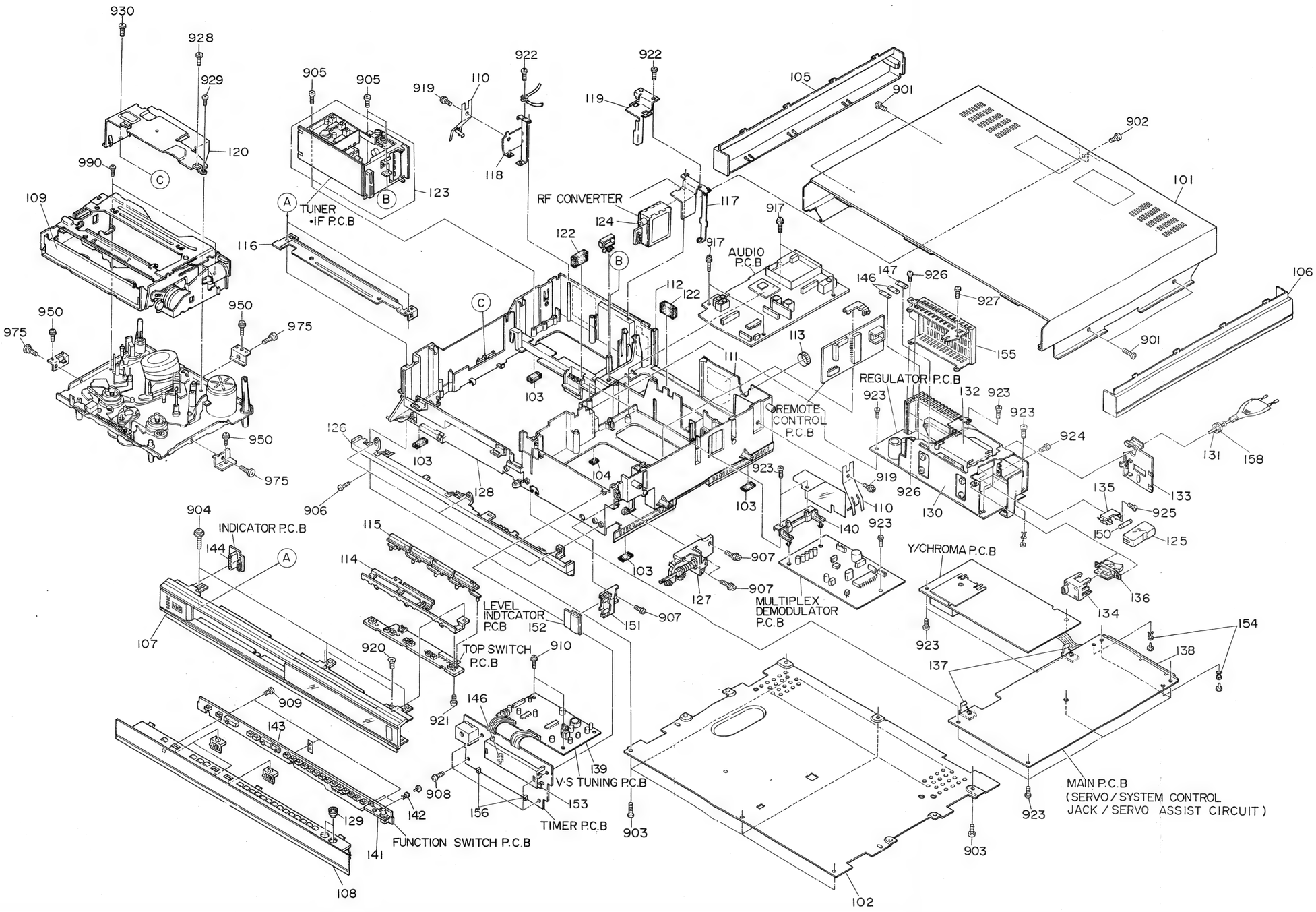
3621026 Dummy reel
3621025 Reeldisk height jig
3040008 1.5mm hexagonal wrench
3621000 Fan type tension gauge
2576171 Height reference plate

3634000 Reference plate
3634026 Reference plate
3634024 Micrometer
6780099 Test tape HI-FI Pal

3984037 Oil kit

3627000 Video head cleaner kit

CABINET SECTION



VHS91 CABINET SECTION

TRANSPORT MECHANISM

Lubrication
Lubrication points are shown in the exploded view diagrams by marks.
Lubricants shown in the diagram are as follows:

Ⓟ Pan motor oil (x 10W -40)

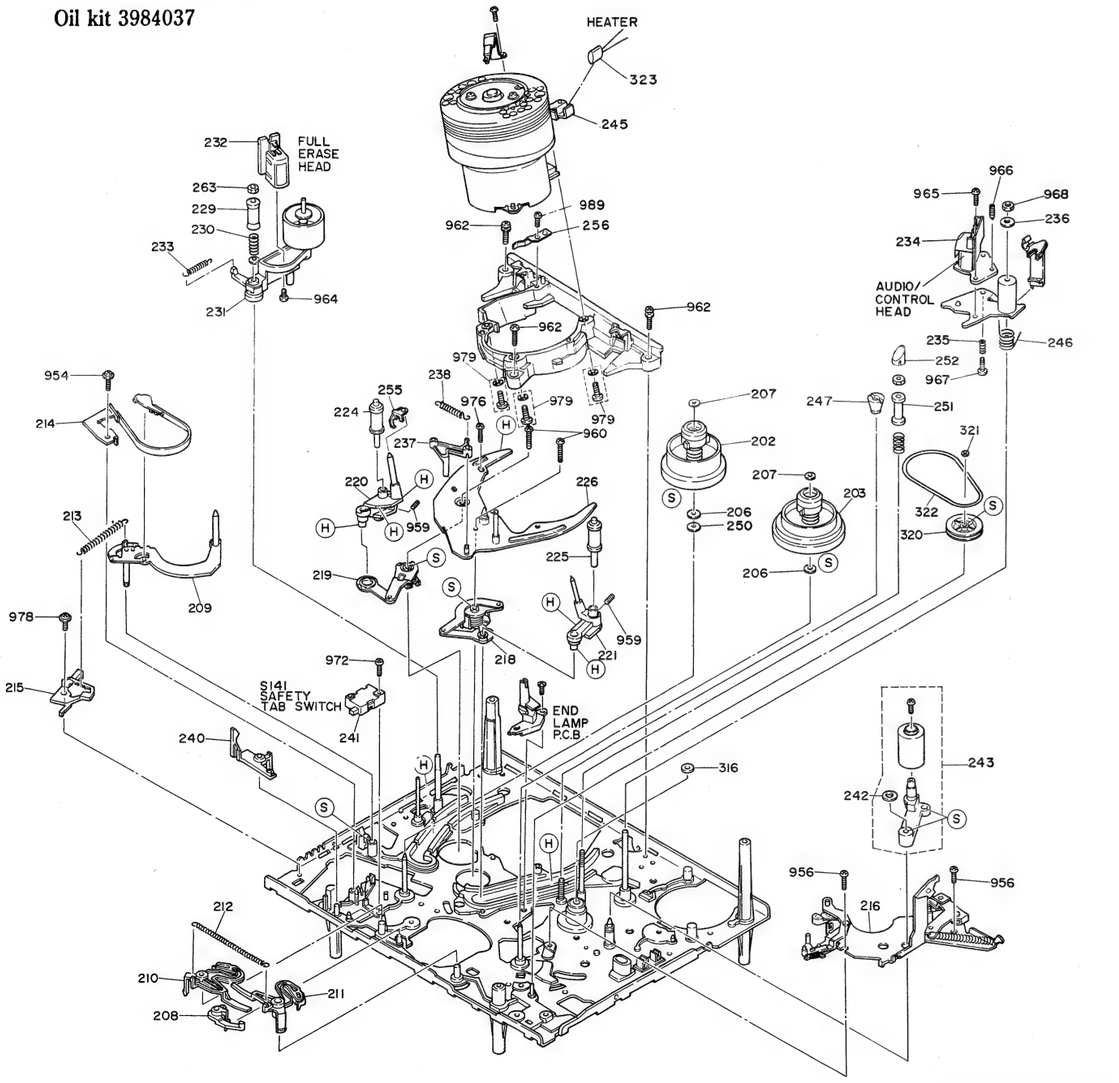
Ⓢ Sonic slider oil (# 1600)

Ⓢi Silicone grease (KS-64)

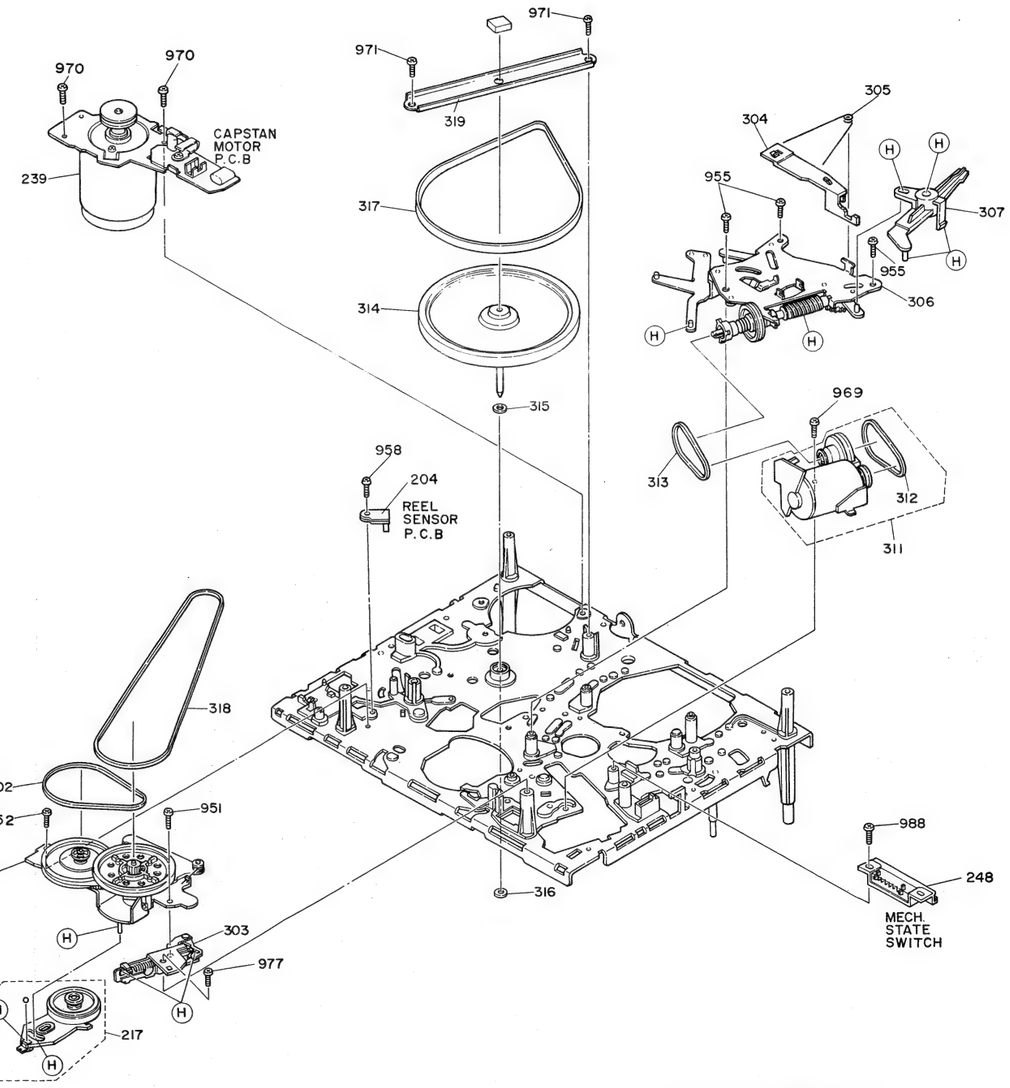
Ⓗ Hitazol (MO-138)

No symbol Froil (GB-TS-)

Oil kit 3984037

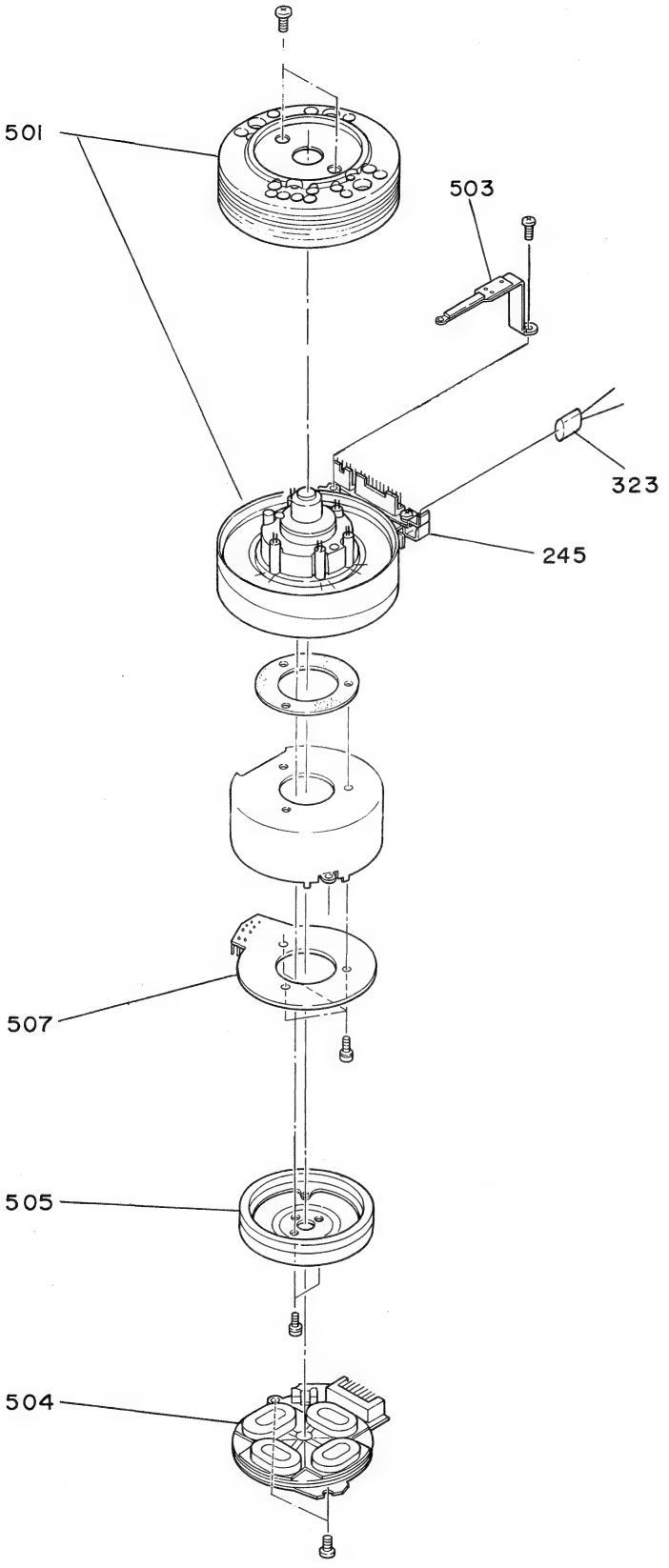


VHS 91 TRANSPORT MECHANISM ASSEMBLY



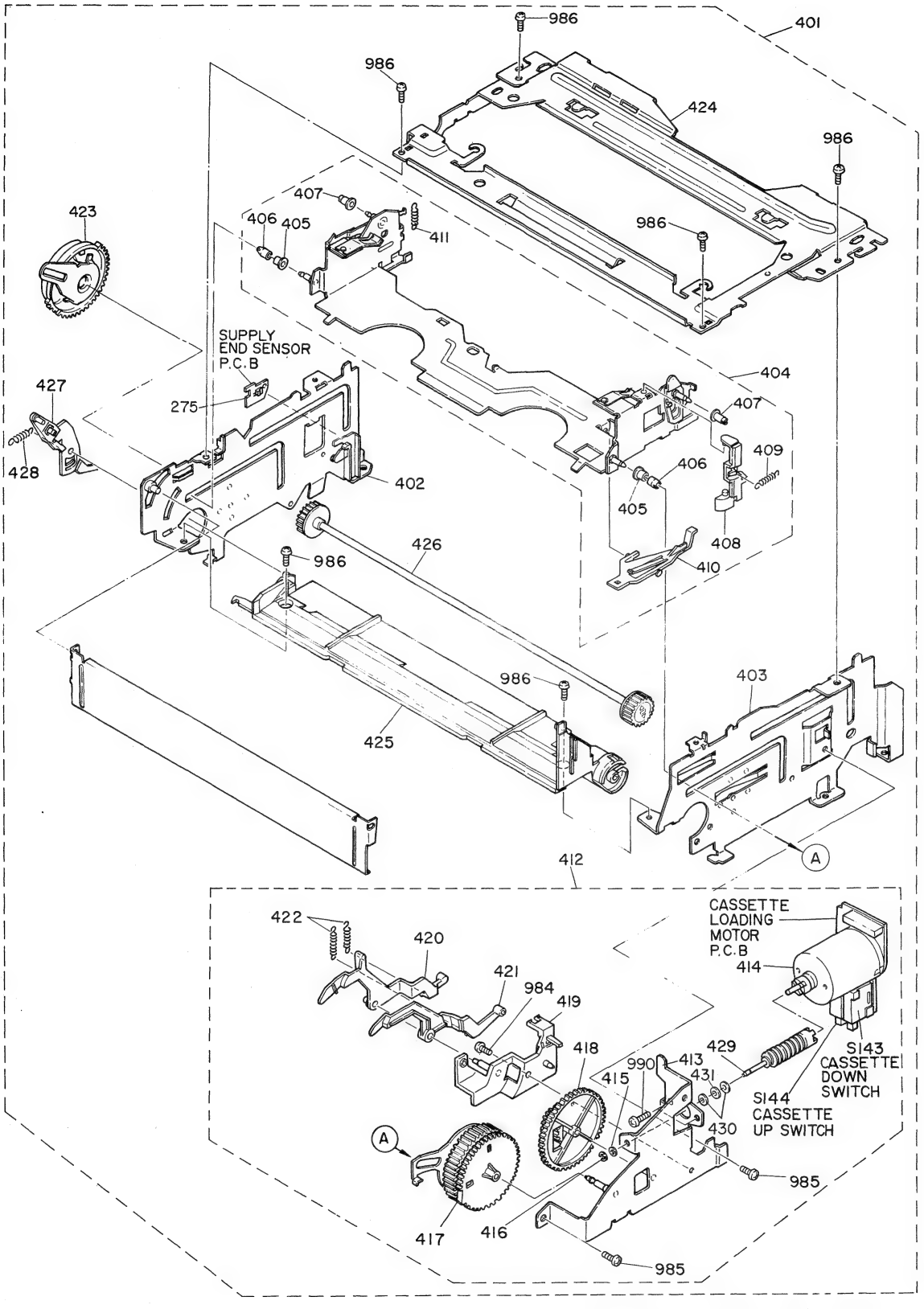
VHS91 BOTTOM SIDE MECHANISM ASSEMBLY

CYLINDER SECTION



VHS 91 CYLINDER SECTION

CASSETTE LOADING MECHANISM



VHS 91 CASSETTE LOADING MECHANISM ASSEMBLY

KNOB FUNCTION

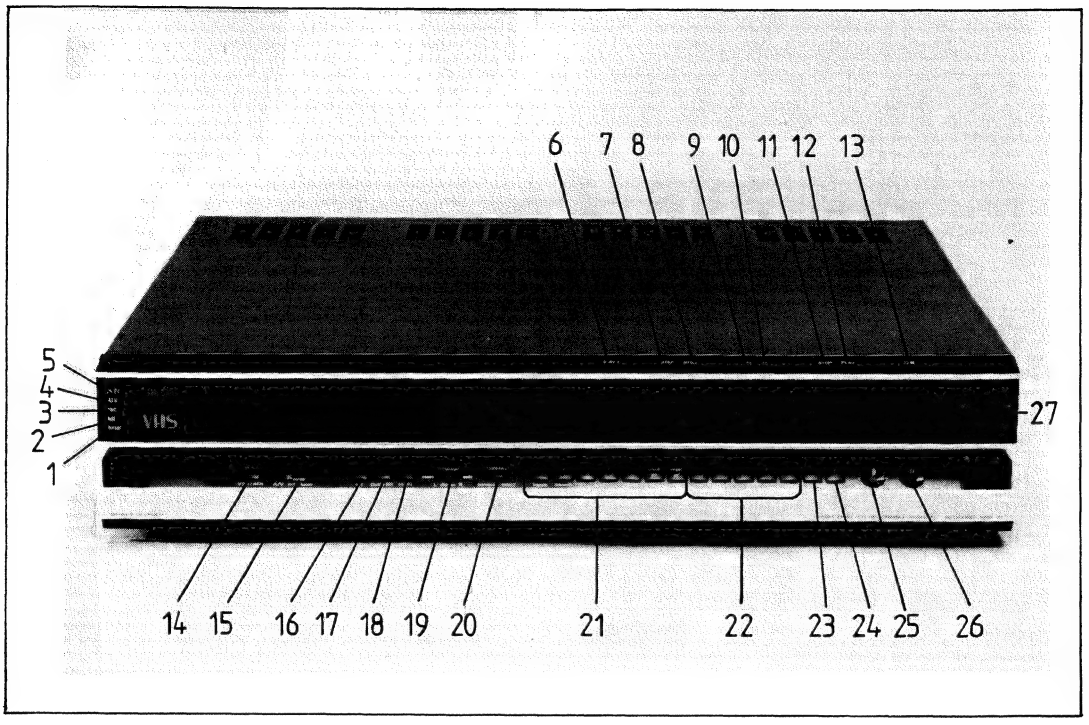


Fig. 1 Front View

1. TIMER INDICATOR
2. DOLBY NR INDICATOR
3. REC INDICATOR
4. ATR INDICATOR
5. Hi Fi INDICATOR
6. EJECT BUTTON
7. STEP (FRAM ADVANCE) BUTTON
8. STILL (PAUSE) BUTTON
9. << (REWIND·VISUAL SEARCH) BUTTON
10. >> (FAST FORWARD·VISUAL SEARCH)
11. STOP BUTTON
12. PLAY BUTTON
13. ○● (OPERATION) BUTTON
14. VTR/ATR SWITCH
15. A/V-ext.-tuner (INPUT SELELCT) SWITCH
16. rec BUTTON

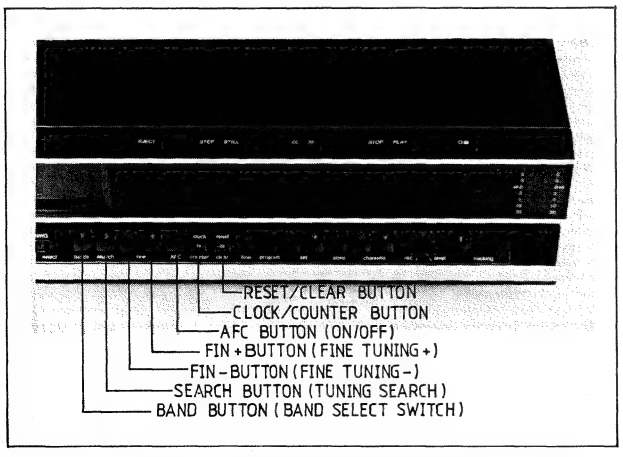


Fig. 2 Channel Preset Button

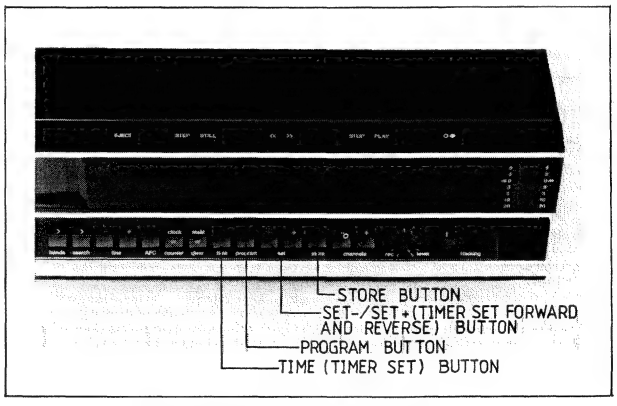
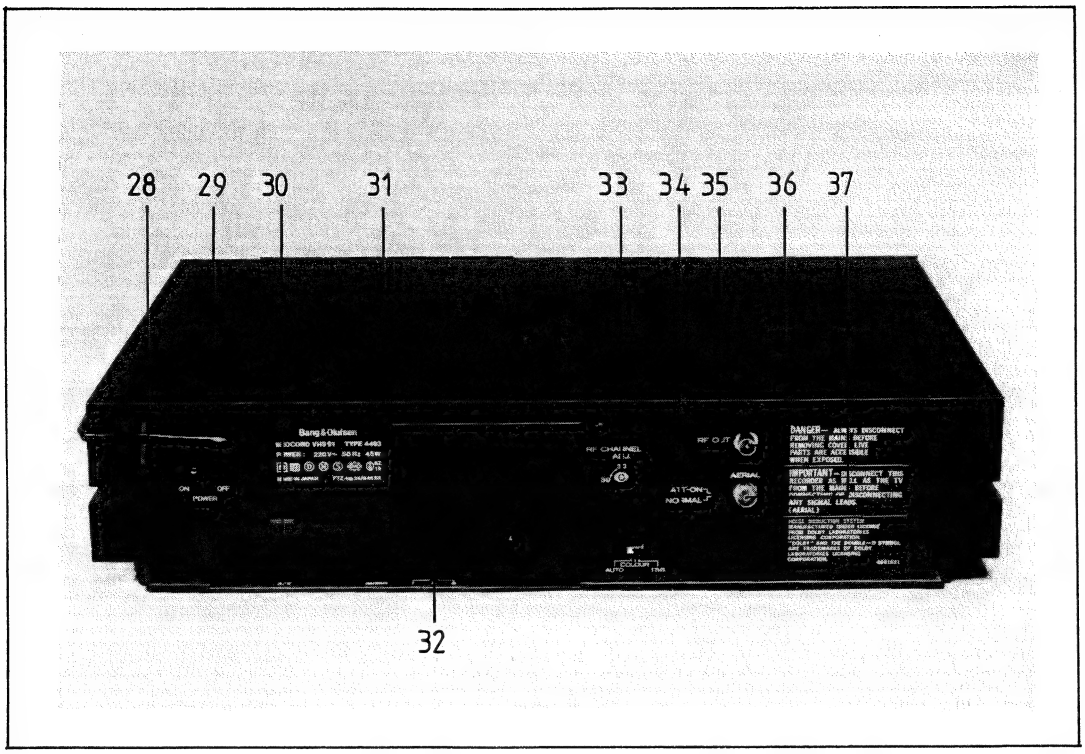


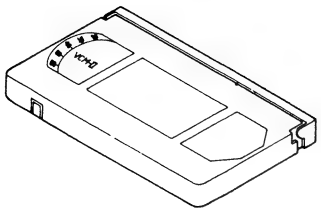
Fig. 3 Timer Set Button

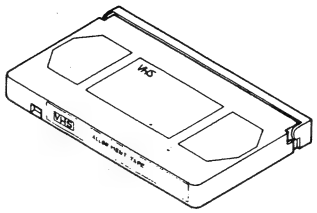
17. Dolby NR SWITCH
18. HiFi /NORMAL SWITCH
19. LCH-STEREO-RCH SELECT SWITCH
20. normal-select (TUNING) SWITCH
21. CHANNEL PRESET BUTTON
22. TIMER SET BUTTON
23. Channels - (CHANNEL DOWN) BUTTON
24. Channels + (CHANNEL UP) BUTTON
25. rec level CONTROL
26. tracking CONTROL
27. LEVEL INDICATOR

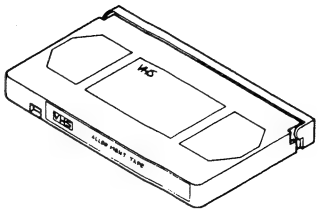


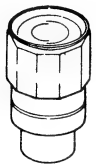
28. MAINS POWER SWITCH
29. MAINS LEAD
30. PERI CONNECTOR (21 PIN)
31. DIN JACK (7 PIN)
32. REMOCON SELECTOR SWITCH (1-2-3)
33. RF CHANNEL ADJ.
34. ATTENUATTER SWITCH (ATT ON)
35. AUTO/COLOUR/TSG SWITCH
36. RF OUTPUT SWITCH
37. AERIAL INPUT SOCKET

SERVICING JIGS AND TOOLS

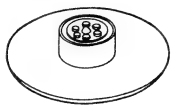
1 

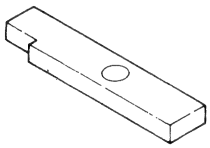
2 

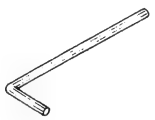
3 

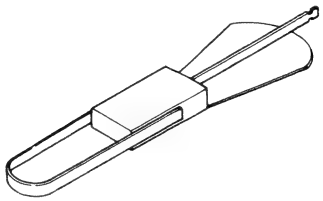
4 

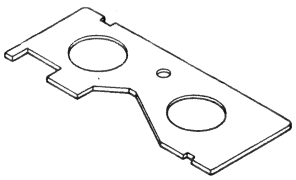
5 

6 

7 

8 

9 

10 

Servicing Tools

001	6780094	Back tension meter	007	3621025	Reel disk height jig
002	6780093	Aligment tape (PAL)	008	3040008	1.5 mm hexagonal wrench
003	6780096	FM Audio alilgment cassette	009	3621000	Fan type tension gauge
004	3621027	Torque gauge	010	2576171	Height reference plate
005	3014064	Torque gauge adaptor			
006	3621026	Dummy reel		3984037	Oil kit
				3627000	Video head cleaner kit

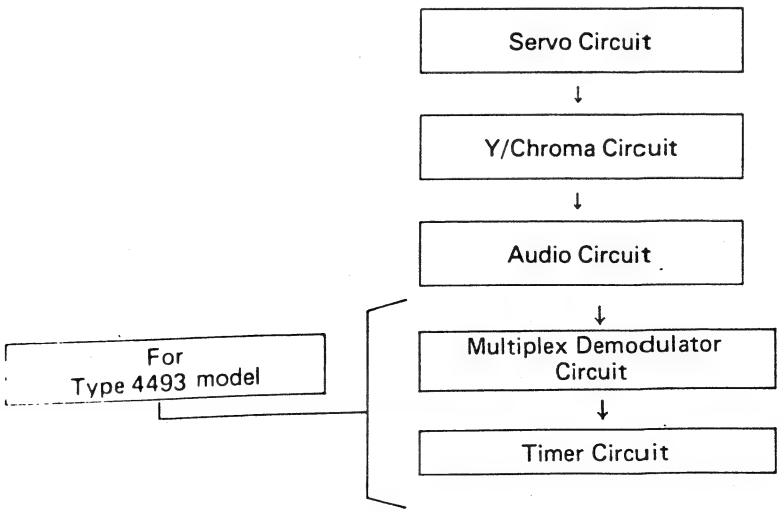
ELECTRIC CIRCUIT ADJUSTMENT

Test equipment, jigs and tapes required for overall circuit adjustment.

1) Color TV set
2) Oscilloscope
3) VTVM
4) Color bar signal generator
5) Frequency counter
6) DC voltmeter
7) Alignment tape
8) Blank tape

Order of adjustment

Perform adjustment in the order shown below.



1. REMOVING THE CASE

1. Side panel L, R (Fig. 5)

1) Pull the side panels in the directions of the arrows to release the fittings with the top cover and remove the left and right side panels.

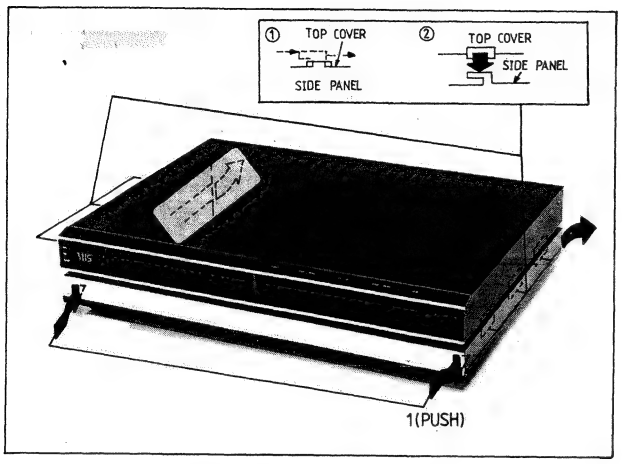


Fig 5. Side Panel L, R

2. Top cover (Fig. 6)

1) Remove the side panels L, R (Item 1).
2) Remove 5 screws (2-1, 2-2).

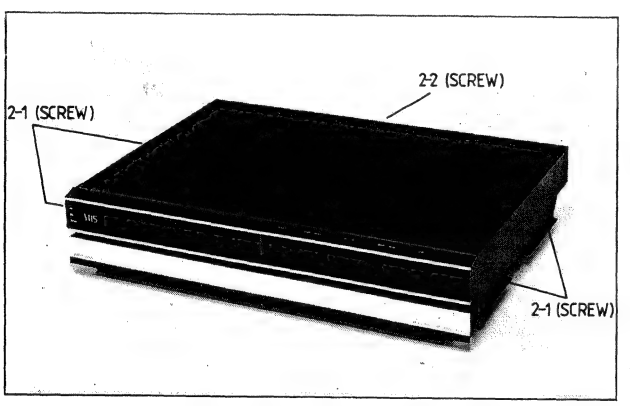


Fig. 6 Top Cover

3. Bottom cover (Fig. 7)

1. Remove 6 screws (3).

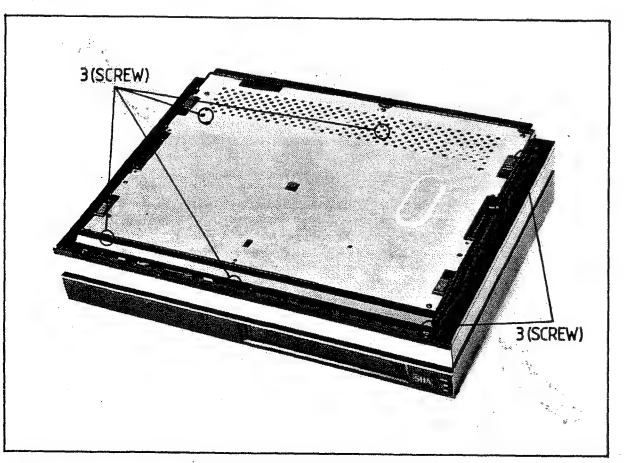


Fig. 7 Bottom Cover

4. Front panel (Fig. 8)

1) Remove 3 screws (4-1).
2) Open 3 fittings (4-2) with the frame upward to remove the front panel in the direction of the arrow.

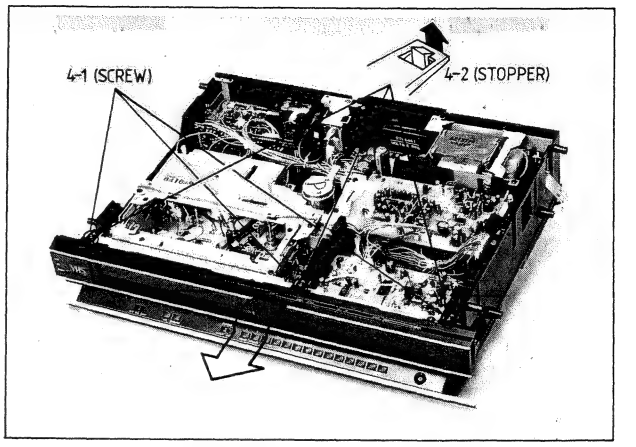


Fig. 8 Front Panel

5. Control block door (Figs. 9, 10)

1) Remove side panels L, R (Item 1).
2) Remove the top cover (Item 2).
3) Remove the front panel (Item 4).
4) Release the fitting between the shaft and damper on the right of the control block door by pulling it in the direction of arrow Ⓐ (5-4).
5) Apply static force P to the tip of the control block door to turn the door centering around pivot B and release the fitting between the door and frame to remove the door (5-5).

When reinstalling the control block door.

A) Align the fitting between the control block door and frame by pressing the door in the direction of arrow Ⓒ. (5-A)
B) Check that the door gear and damper gear are engaged with each other, then fit the control block door shaft and damper by turning the door in the direction of arrow Ⓓ. (5-B).

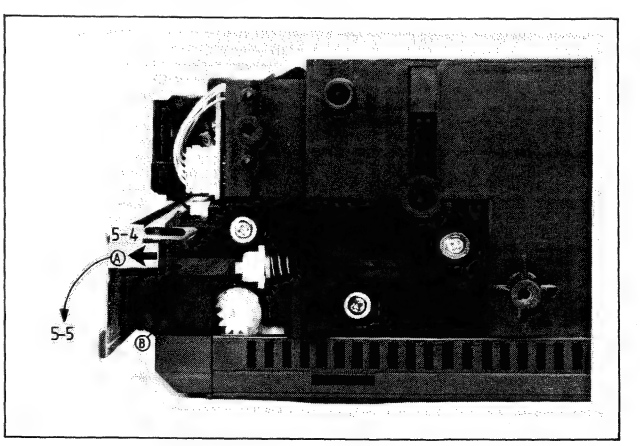


Fig. 9 Control Block Door

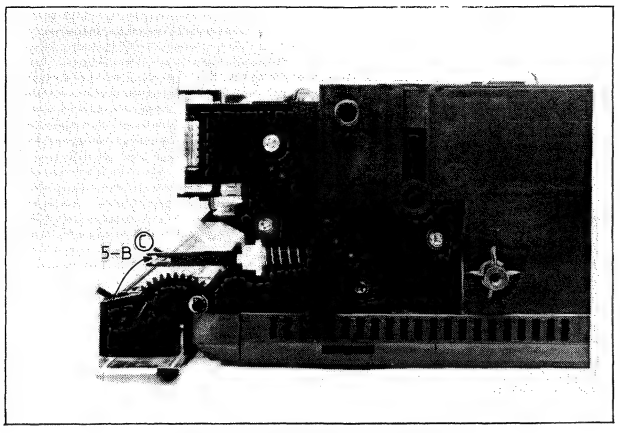


Fig. 10 Control Block Door

6. Damper Assembly (Fig. 11)
1) Remove the side panel L, R (Item 1).
2) Remove the top cover (Item 2).
3) Remove the Front panel (Item 4).
4) Remove 3 screws (6).

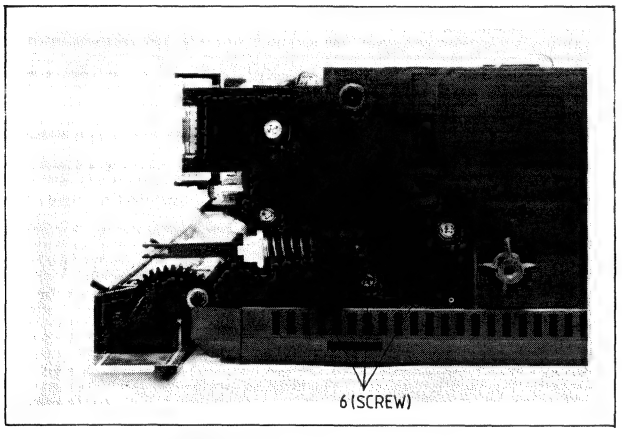


Fig. 11 Damper Assembly

2. PC BOARD LOCATIONS

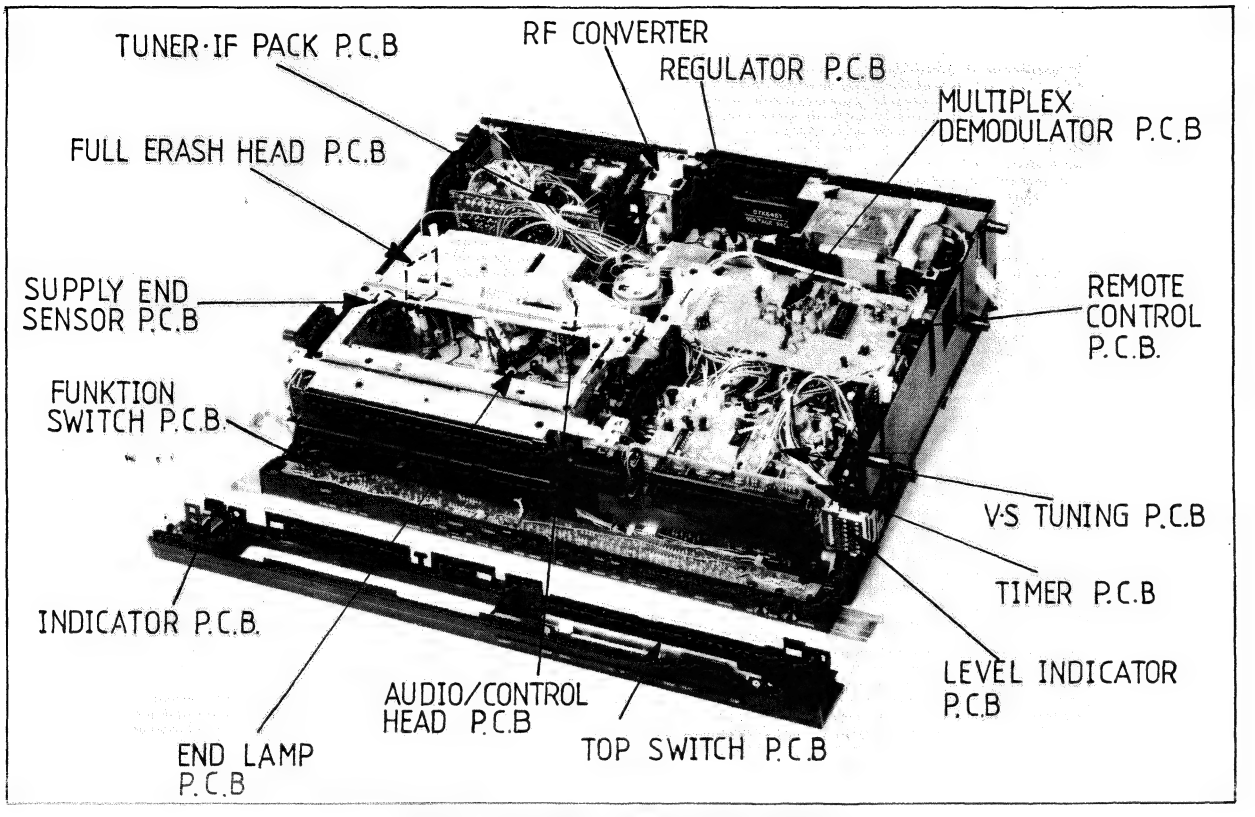


Fig. 17 Top View of PC Location Board

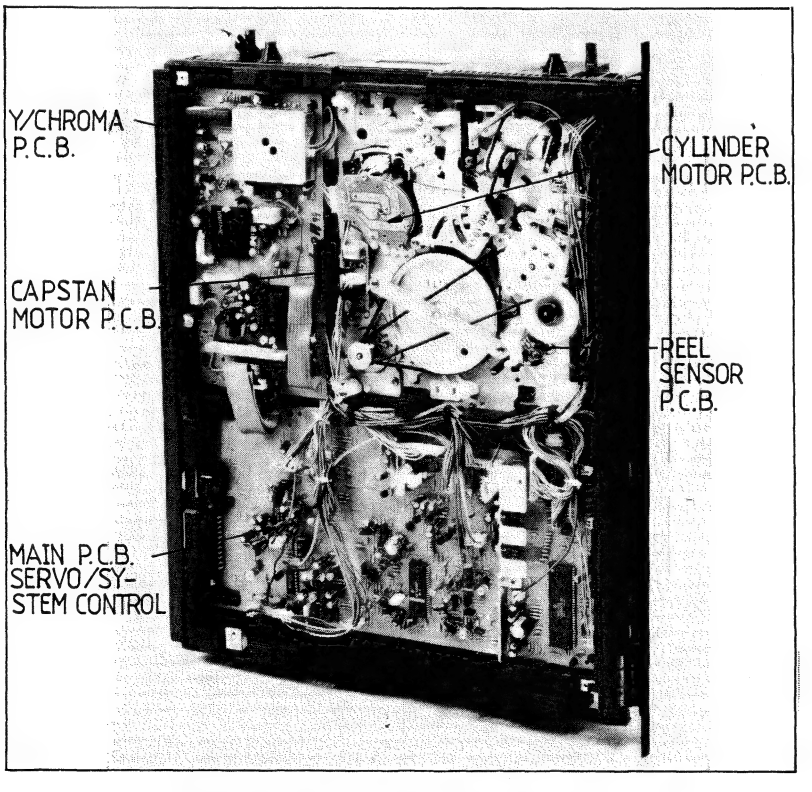


Fig. 18 Bottom View of PC Board Location

3. REMOVING THE PC BOARDS

1. Top Switch P. C. Board (Figs. 19,20)
1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove the front panel (Item 1-4).
4) Remove 2 top switch board bracket fixing screws (7-1). (See Fig. 19).
5) Taking care of the operation buttons, pull out the top switch board upward (7-2). (See Fig. 20).

2. Indicator P. C. Board (Fig. 20)
1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove the front panel (Item 1-3).
4) Release 3 stoppers (8) and remove the indicator board.

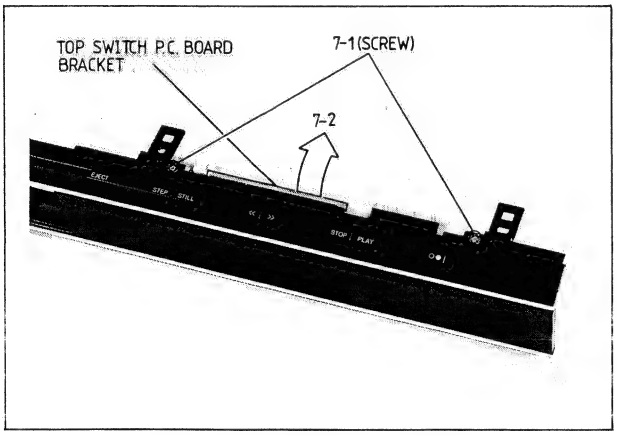


Fig. 19 Top Switch P.C. Board

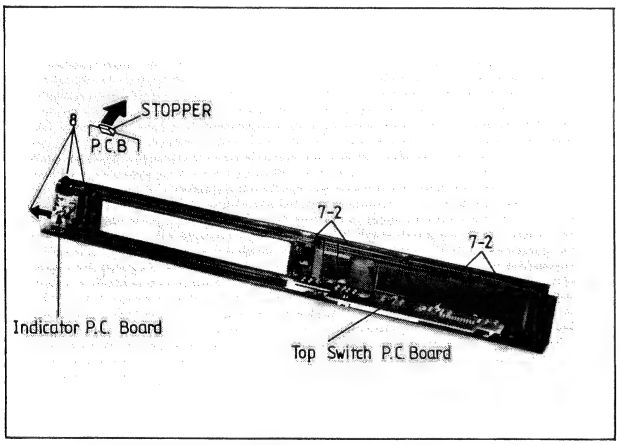


Fig. 20 Top Switch/Indicator P.C. Board

3. Function Switch P. C. Board (Fig. 21)
1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove the front panel (Item 1-4).
4) Remove the control block door (Item 1-5).
5) Remove 3 function switch board fixing screws (9-1).
6) Taking care of the fitting sections between the tuning select slide knob/input select knob/tracking control knob and the function switch board, slide the board in the direction of arrow (9-2) to remove it.

When reinstalling the Function Switch P. C. Board
A) Reinstall the board, taking care of the tuning select slide knob/input select knob/tracking control knob and the control rod positions of each switch on the function switch board.
B) Follow the reverse procedure to removal except for the above.

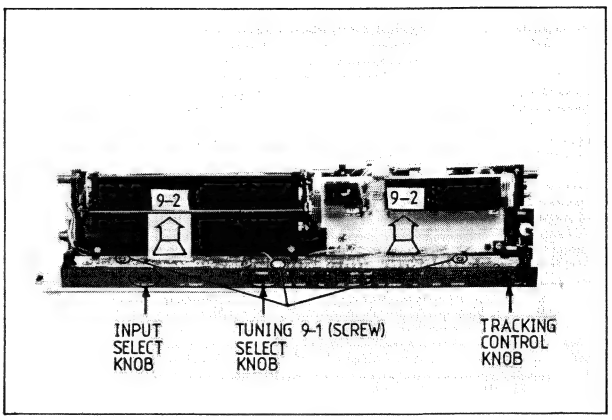


Fig. 21 Function Switch P.C. Board

5. Timer P. C. Board (Figs. 13,14)
1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove the front panel (Item 1-4).
4) Remove the control block door (Item 1-5).
5) Remove 4 timer board fixing screws (10-1).
6) Release the wires from 2 wire retainers (10-2) and disconnect the connector from the function switch board.
7) Disconnect connector (10-3).
8) Pull out 2 flat cables by depressing the connector covers shown in Fig. A.(10-4) When reconnecting the flat cables, align the wires of the flat cables and insert the cables while depressing the connector covers.

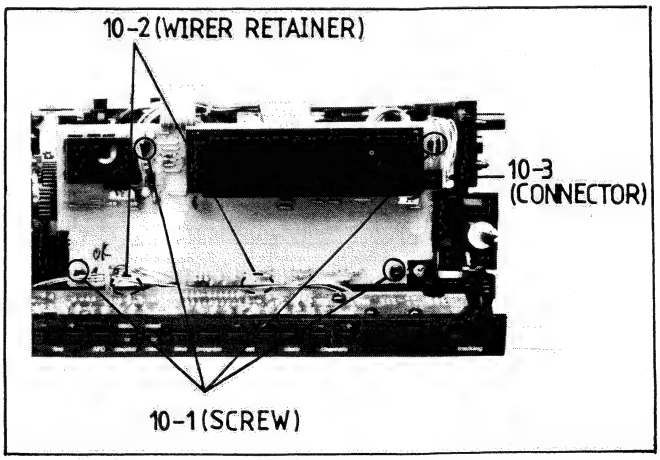


Fig. 22 Timer P.C. Board

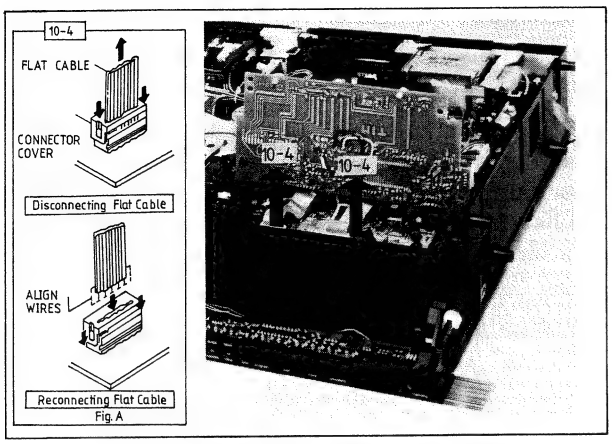


Fig. 23 Timer P.C. Board/Flat Cable

6. V-S Tuning PC board (Fig. 24)

1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove the front panel (Item 1-4).
4) Remove 2 V·S tuning board fixing screws (11-1).
5) Push to open 2 stoppers and remove the V·S tuning board.
6) When replacing the board, disconnect 2 connectors and flat cable (11-3).
   * Refer to item 5 Timer P. C. Board Removal for disconnecting the flat cable.

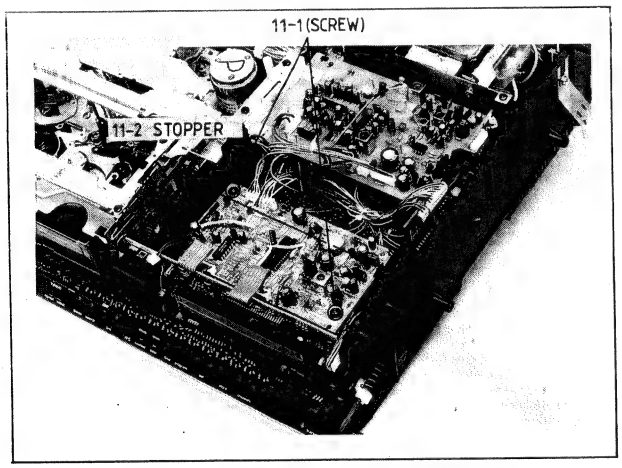


Fig. 24 V · S. Tuning P.C. Board

7. Audio P. C. Board (Fig. 25)

1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove the rubber cap from the frame (12-1).
4) Remove the audio board fixing screw (12-2) and turn the board in the direction of the arrow (12-3) to check the pattern side.
5) When replacing the board, further remove 2 board holder fixing screws (12-47 and disconnect 5 connectors (12-5) remove the board.

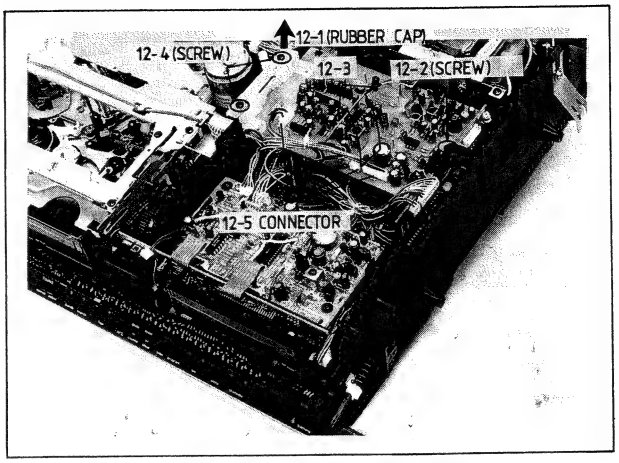


Fig. 25 Audio P.C. Board

8. Regulator P. C. Board (Fig. 26)
1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove 4 regulator board fixing screws (13-1).
4) Lift up the power frame assembled with the AC outlet, transformer and regulator board (13-2) to remove the frame.

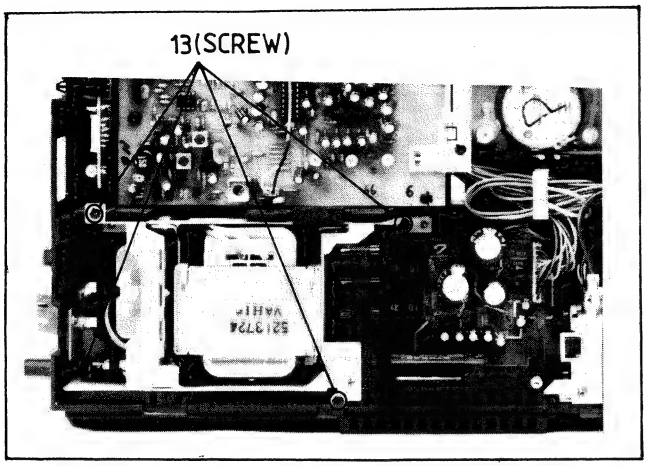


Fig. 26 Regulator P.C. Board

9. RF Converter (Fig. 27)
1) Remove side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Remove RF converter support plate fixing screw (14-1).
4) Push stopper (14-2) and pull out the RF converter in the direction of arrow (14-3).

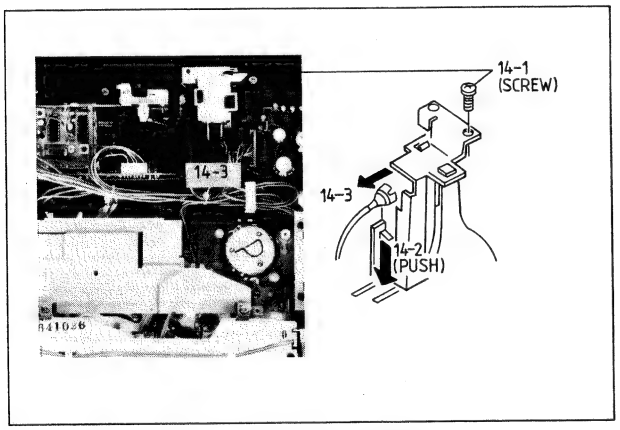


Fig. 27 RF Converter

10. Tuner/IF pack P. C. Board (Fig. 28)
1) Remove the side panels L, R (Item 1-1).
2) Remove the top cover (Item 1-2).
3) Disconnest 2 connectors (15-1).
4) Remove 4 screws (15-2).
   * Assemble the tuner/If pack board by the reverse procedure to removal.

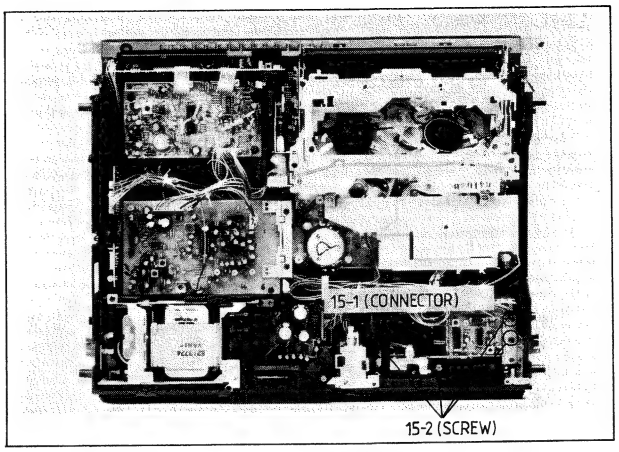


Fig. 28 Tuner/IF Pack

11. Y/Chroma P. C. Board (Figs. 29, 30)
1) Remove the bottom cover (Item 1-3).
2) Disconnect 2 connectors (16-1).
3) Remove 2 screws (16-2).
4) Pull out 2 flat cables by depressing connector covers (16-3) shown in Fig. 20. When reconnecting the flat cables, align the wires and insert the cables while depressing the connector covers.

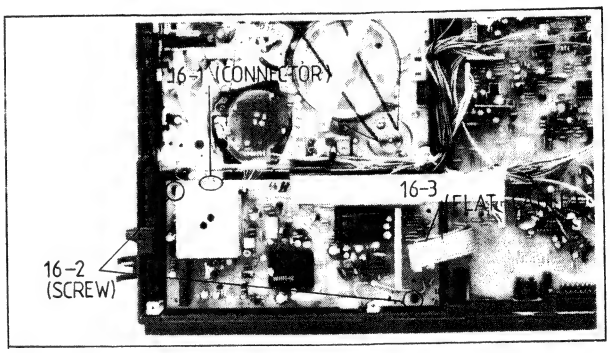


Fig. 29 Y/Chroma P.C. Board

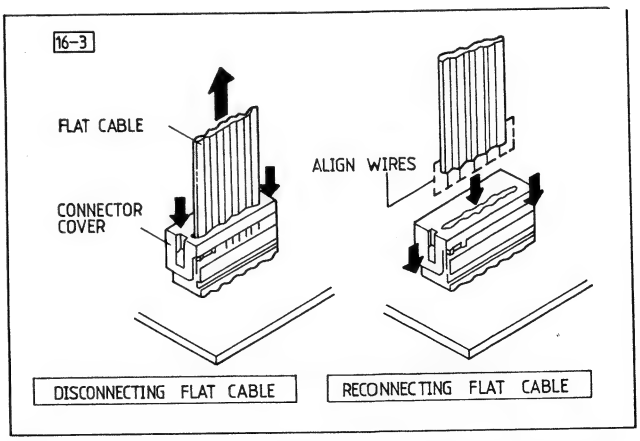


Fig. 30 Disconnecting/Reconnecting Flat Cable

12. Main P. C. Board (Fig. 31)

1) Remove the bottom cover (Item 1-3).
2) Remove 6 main board fixing screws (17-1) and push to open 2 stoppers (17-2) to remove the main board in the direction of the arrow.
3) When replacing the board, further disconnect 2 flat cables (17-3) from the Y/Chroma board and 15 connectors (17-4) to remove the board.

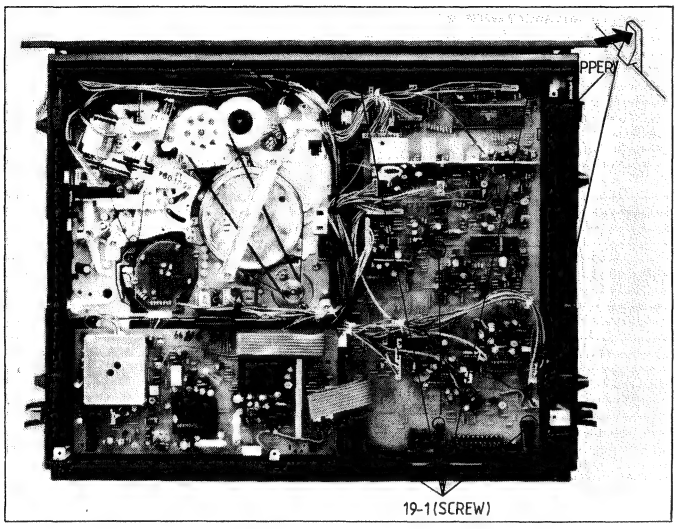


Fig. 31 Main P.C. Board

4. CASSETTE LOADING MECHANISM PARTS LOCATIONS

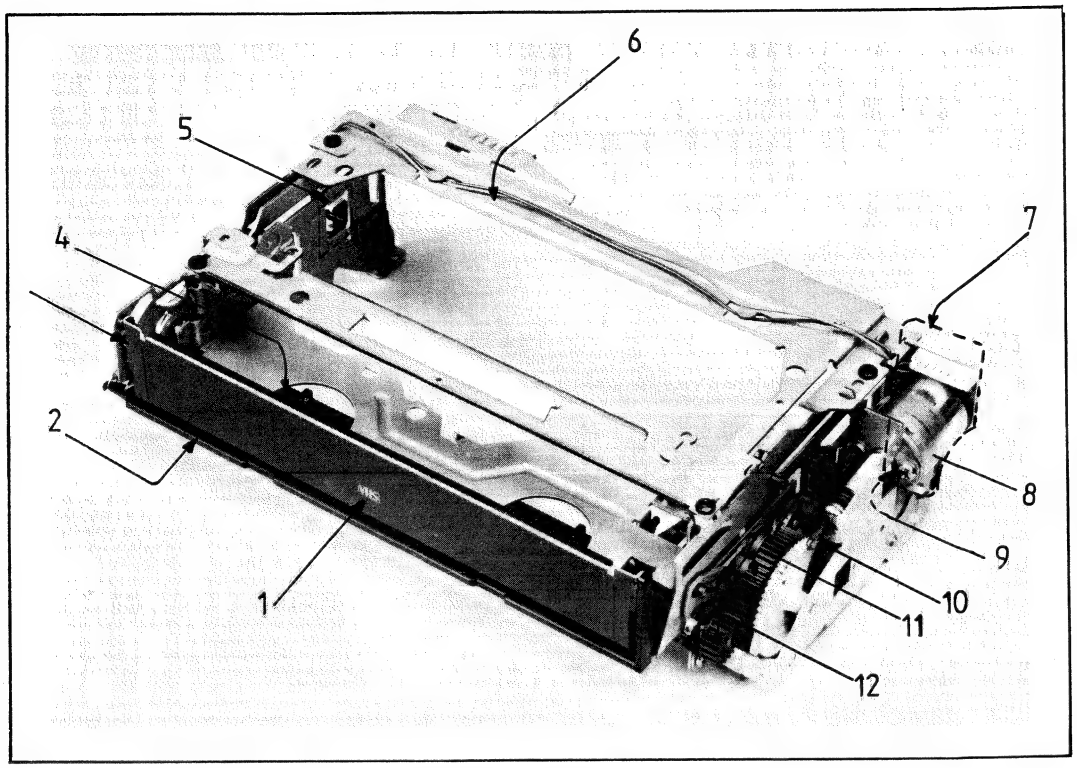


Fig. 32 Cassette Loading Mechanism

1. CASSETTE DOOR
2. FRONT HOLDER
3. DOOR ARM
4. CASSETTE HOLDER ASSEMBLY
5. SUPPLY END SENSOR BOARD
6. CHASSIS HOLDER
7. CASSETTE LOADING MOTOR BOARD
8. CASSETTE IN SWITCH
9. CASSETTE UP SWITCH
10. DRIVE GEAR
11. CLUTH GEAR
12. SYNCHRO GEAR

5. REMOVING THE CASSETTE LOADING MECHANISM PARTS

1. Cassette Loading Mechanism (Figs. 33)

1) Remove 3 screws, and take out the shield cover.
2) Slide the reinforcing plate in the direction of the arrow to remove it and then disconnect connector.
3) Remove 2 screws and then remove the whole cassette loading mechanism after lifting its rear.

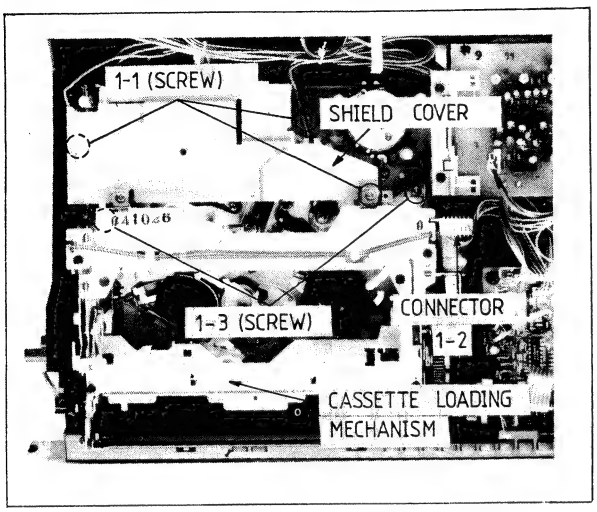


Fig. 33 Cassette Loading Mechanism

2. Chassis Holder (Fig. 34)

1) Remove 4 chassis holder fixing screws. (2)

3. Cassette Door (Fig. 34)

1) Push the top right of the front holder to the right to release its fitting with the front holder. (3)

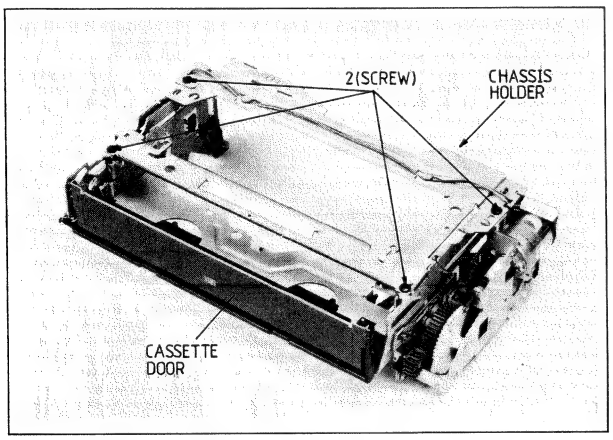


Fig. 34 Chassis Holder/Cassette Door

4. Supply End Sensor P. C. Board (Fig. 35)

1) Release the stopper. (4)
   * The supply end sensor board can be removed without removing the cassette loading mechanism. The takeup end sensor is made in one unit with the cassette loading board, so refer to item 8.

5. Door Arm (Fig. 35)

1) Remove the spring and then release its 2 fitting positions with the frame. (5)

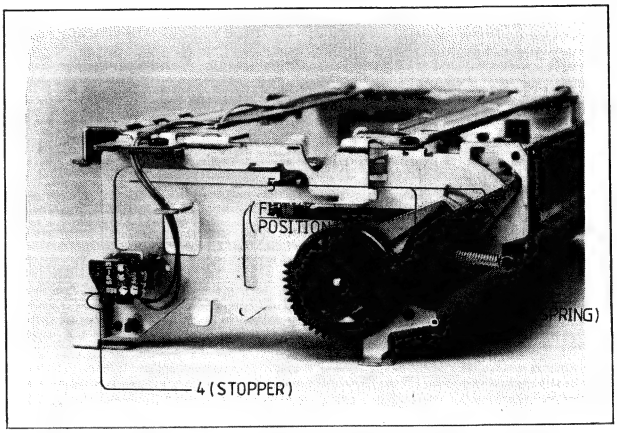


Fig. 35 Supply End Sensor Board/Door Arm

6. Front Holder (Fig. 38)

1) Remove the cassette loading motor block assembly. (Refer to item 4-7.)
2) Remove the chassis holder/cassette door. (Refer to items 4-2, 4-3)
3) Remove 2 front holder fixing screws. (6)

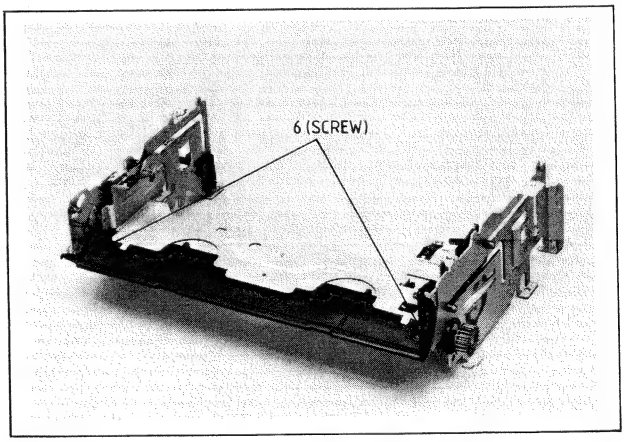


Fig. 36 Front Holder

7. Cassette Loading Motor Block Assembly (Fig. 37)

1) Remove 2 cassette loading motor block assembly fixing screws. (7)

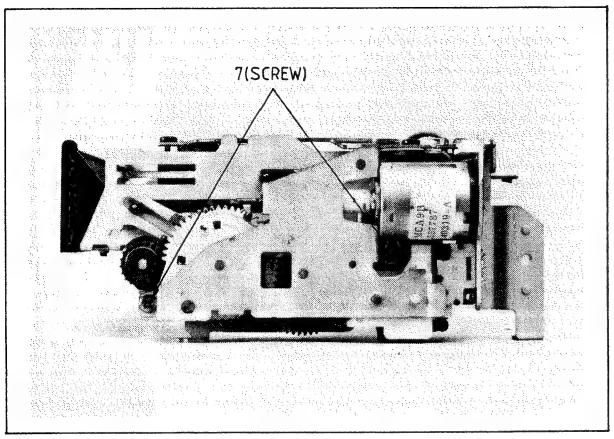


Fig. 37 Cassette Loading Motor Block Assembly

8. Cassette Loading Motor (Fig. 38)

1) Remove 2 cassette loading motor fixing screws.

9. Switch Lever (Fig. 38)

1) Remove 2 springs and pull out the switch lever in the direction of the arrow.

10. Cluth Gear (Fig. 38)

1) Pull out the clutch gear in the direction of the arrow.

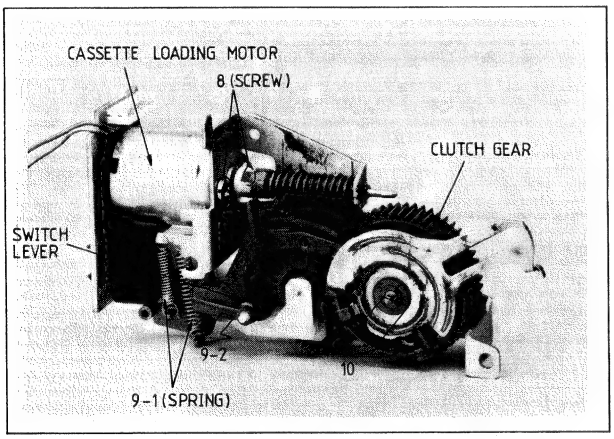


Fig. 38 Cassette Loading Motor/Switch Lever/Cluth Gear

Note: Check the following items when reasembling the cassette loading motor block assembly.

(1) Check that the switch lever is securely inserted into the groove in the clutch gear.
(2) Check that the markings (mark▷and hole○) of the cluth gear and drive gear match.

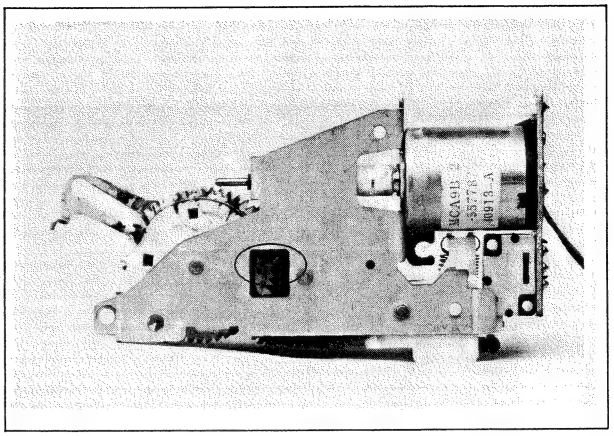


Fig. 39 Gear Marking (I)

Note: Check the following items when reasembling the cassette loading machanism.

(1) Check that the left and right of the cassette holder are securely inserted into the holder drive arms. (Figs. 40, 41)
(2) Check that markings of the left and right synchro gears and clutch gears match. (Figs. 40, 41)

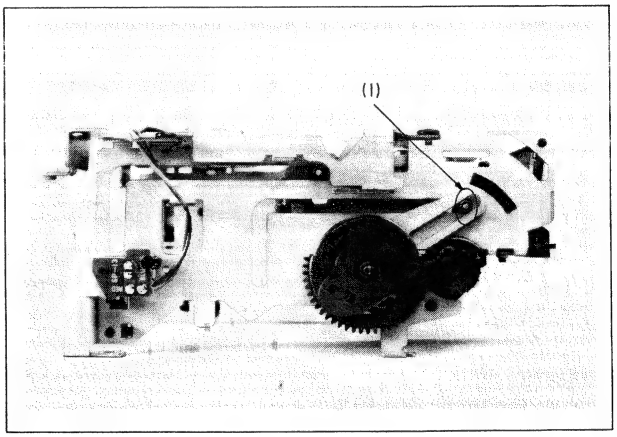


Fig. 40 Gear Marking (II)

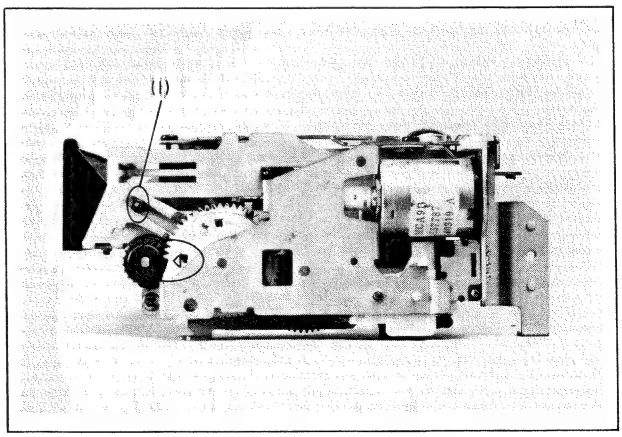


Fig. 41 Gear Marking (III)

6. MAIN MECHANICAL COMPONENTS LOCATIONS

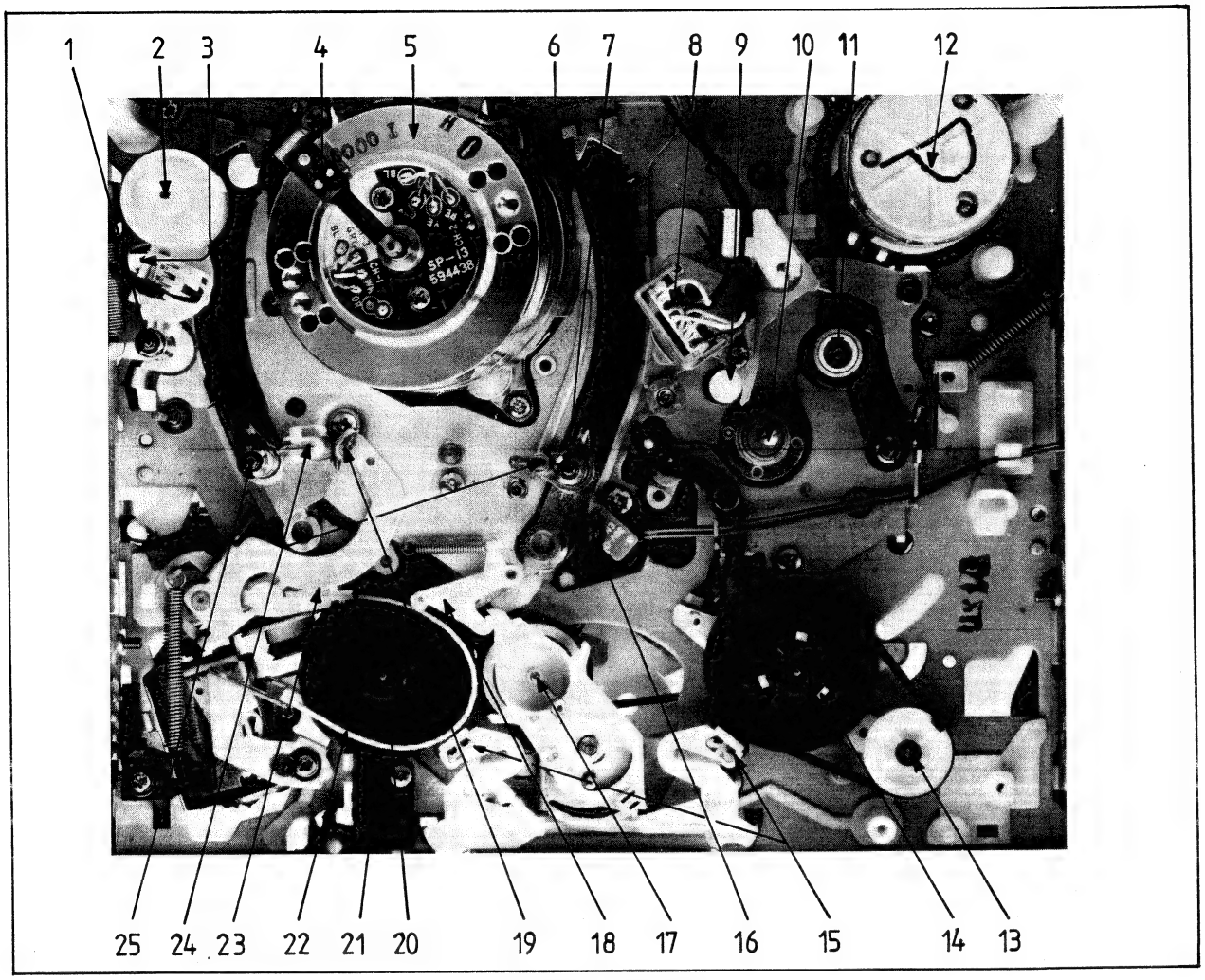
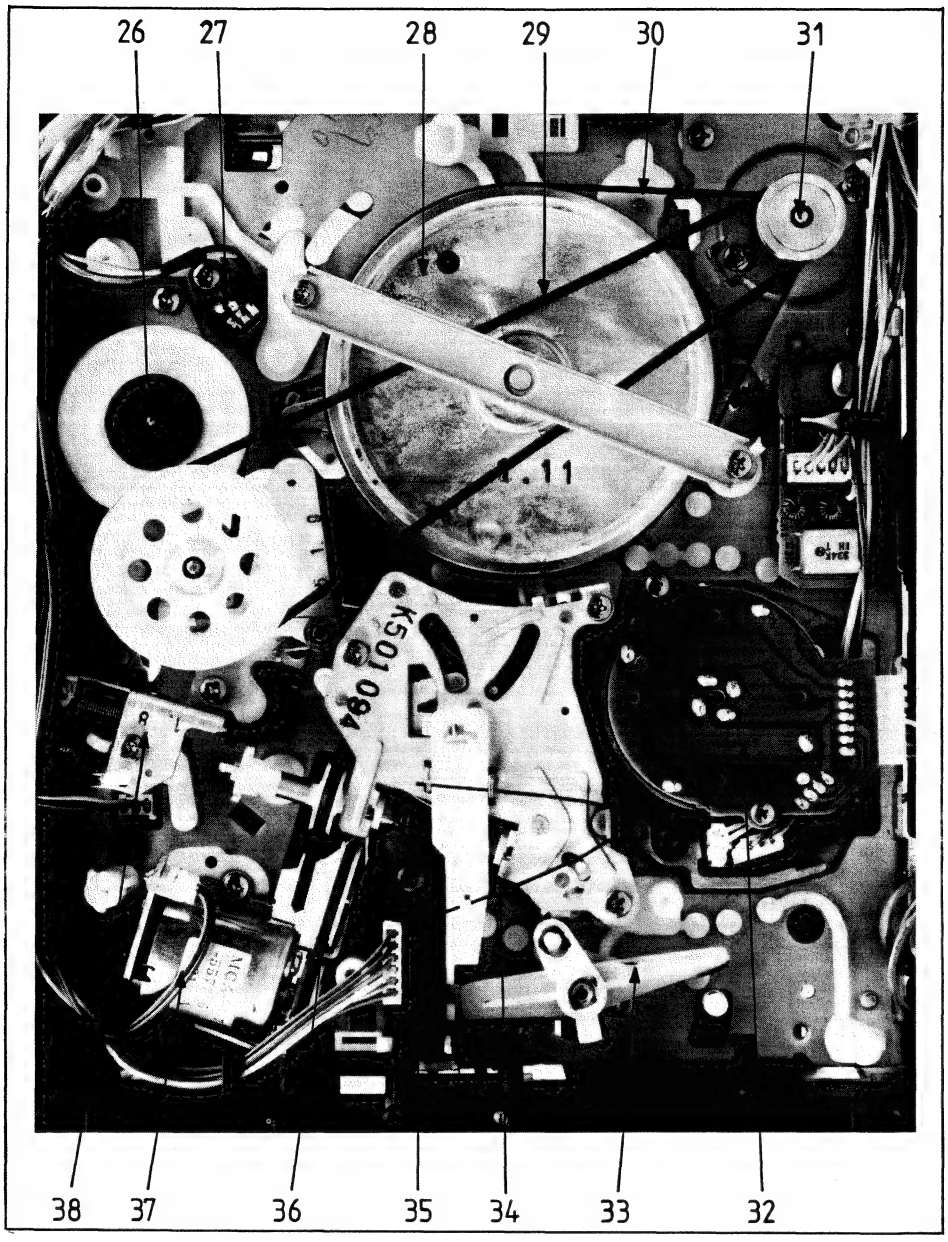


Fig. 42 Top View

1. SUPPLY GUIDE POLE
2. IMPEDANCE ROLLER
3. FULL ERASE HEAD
4. CYLINDER MOTOR BRUSH
5. UPPER CYLINDER
6. CATCHER/CYLINDER BASE
7. TAKE-UP GUIDE ROLLER
8. AUDIO/CONTROL HEAD
9. TAKE-UP GUIDE POLE
10. CAPSTAN SHAFT
11. PRESSURE ROLLER
12. CAPSTAN MOTOR
13. LOAD PULLEY
14. TAKE-UP REEL DISK
15. MAIN BRAKES
16. END LAMP
17. REEL DRIVE IDLER
18. SUB BRAKE
19. TENSION POLE
20. SUPPLY REEL DISK
21. SAFETY TAB SWITCH
22. TENSION BAND
23. TENSION ARM
24. ANGLE POSTS
25. SUPPLY GUIDE ROLLER



26. CLUTCH PLATE ASSEMBLY
27. REEL SENSOR
28. CAPSTAN FLYWHEEL
29. REEL BELT
30. CAPSTAN BELT
31. CAPSTAN MOTOR PULLEY
32. LOWER CYLINDER
33. TENSION RELEASE ARM
34. LOADING GEAR ASSEMBLY
35. MECHANISM STATE SWITCH
36. LOADING BELTS
37. LOADING MOTOR
38. BRAKE SLIDER

7. BEFORE DISASSEMBLING PARTS

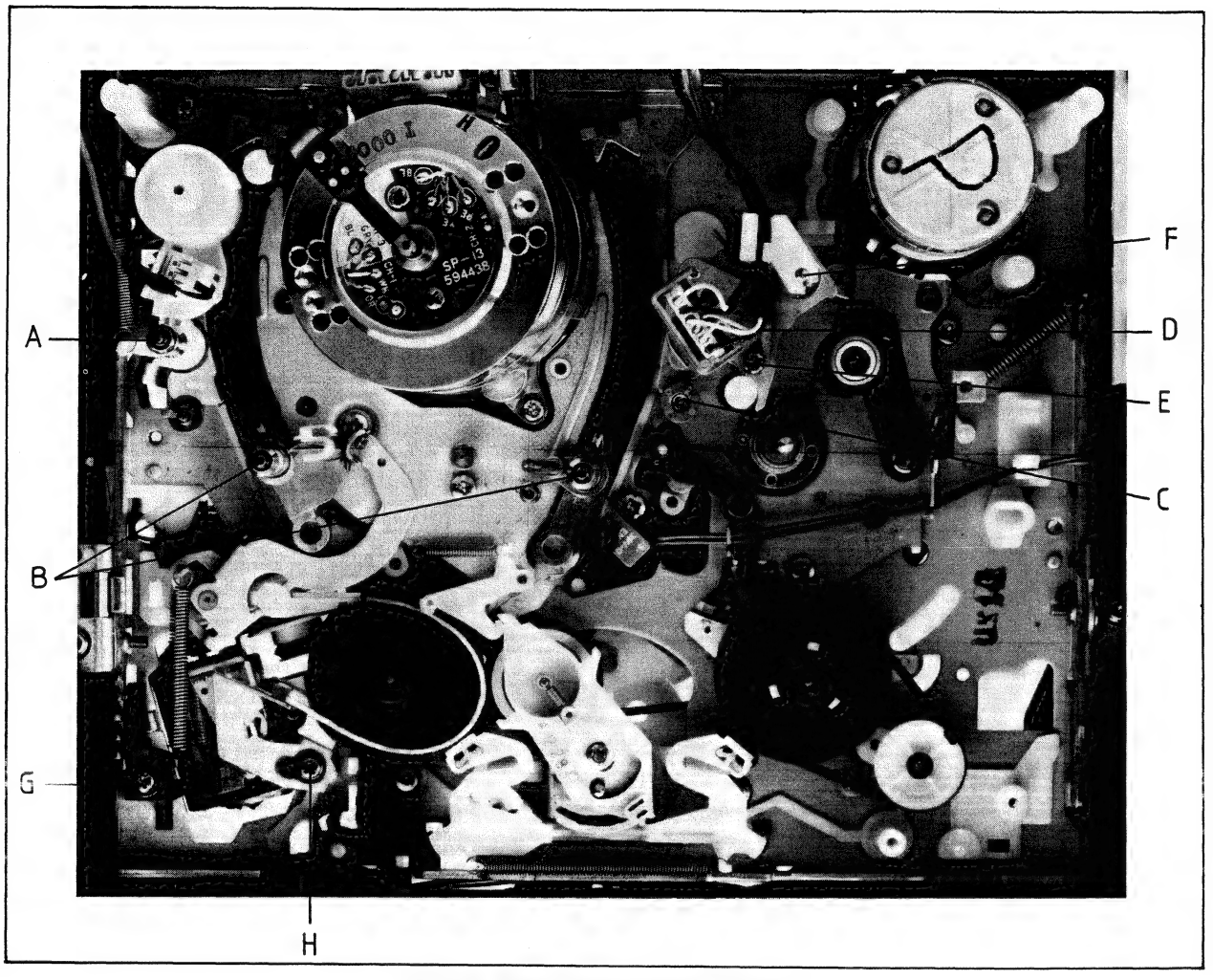


Fig. 44 Before Disassembling Parts

The parts shown below are fixed in the factory using precision jigs so be sure not to loosen their or remove them.

Ⓐ Take-up/supply guide height adjusting nut.
Ⓑ Supply guide roller height adjusting nut.
Ⓒ AC head X value adjusting screw.
Ⓓ AC head tilt adjusting screw.
Ⓔ AC head azimuth adjusting screw.
Ⓕ AC head height adjusting nut.
Ⓖ Back tension adjusting spring holder fixing screw.
Ⓗ Tension band fixing screw.

8. REMOVING THE MAIN ELECTRICAL PARTS

1. Cylinder Assembly
2. Full Erase Head
3. Audio Control Head

1. Video Head (Fig. 45)

1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
2) Remove the screw to remove the board holder.
3) Remove the screw to remove the cylinder motor brush.
4) Remove two connectors of the video head P.C.B. and three connectors under the cylinder.
5) Remove the connector from the cylinder P. C. B.
6) Remove cylinder assembly to remove three cylinder assembly fixing screws.

* Be careful that your fingers or tools do not touch the video head tips during work.
Install the cylinder assembly by the reverse procedure. Adjust as follows after installing.

- Cylinder Speed Assist Adjustment
- Head Switching Point Adjustment
- Tracking Preset Adjustment
- Record Luminance and Chroma Level Adjustments

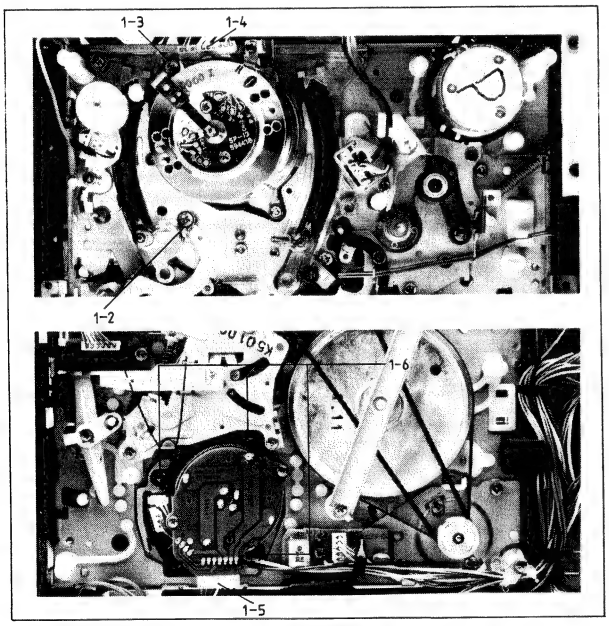


Fig. 45 Cylinder Assembly

2. Full Erase Head [FE Head] (Fig. 46)

1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
2) Remove the spring between the FE head base and the chassis.
3) Remove the guide pole fixing nut to take out the guide pole, spring and washer.
4) Take out the FE head base and then remove the FE head fixing screw at the back of the base.

* Install the full erase head by the reverse procedure. Adjust the guide pole height after installation.

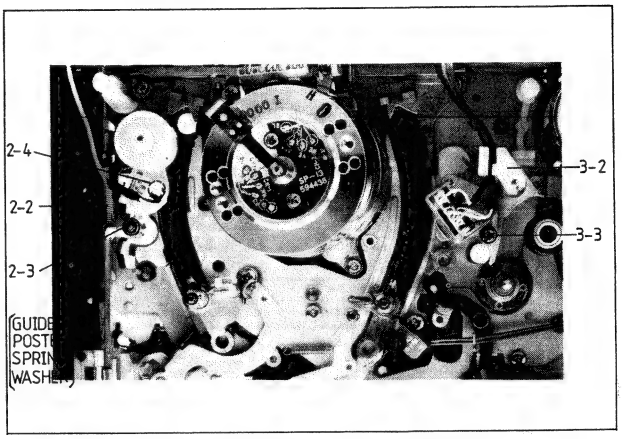


Fig. 46 FE Head, A/C Head

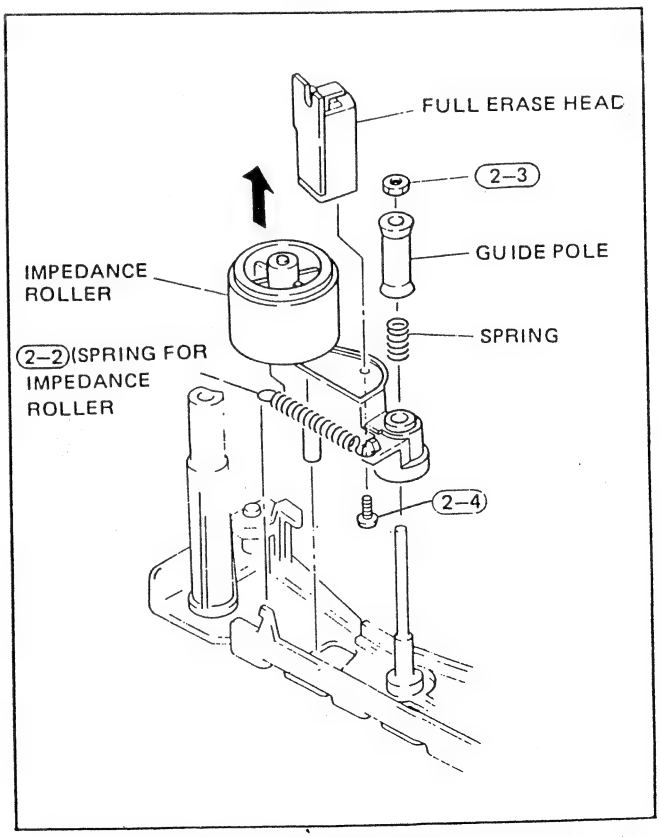


Fig. 47 Full Erase Head

3. Audio/Control Head Removal [AC Head]
(Figs. 32, 34, 35)
1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
2) Remove the cord clamp.
3) Remove the A/C head fixing nut and washer to take out the A/C head assembly.

* Install the audio/control head by the reverse procedure. Fit the bottom of the spring under A/C head base to the chassis and the top to the stopper on the base. Check that the tip of the head base fixing screw is approx. 3 — 4 mm above the top of the base after installing the A/C head assembly and then adjust as follows.

- A/C Head Height Adjustment
- A/C Head Tilt Adjustment
- A/C Head Azimuth Adjustment
- A/C Head Position Adjustment

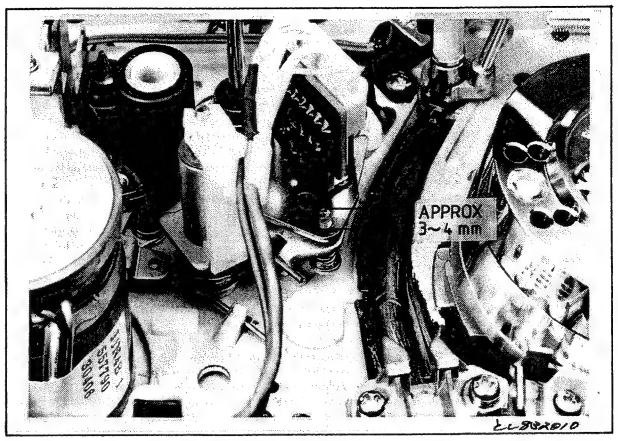


Fig. 49 Audio/Control Head

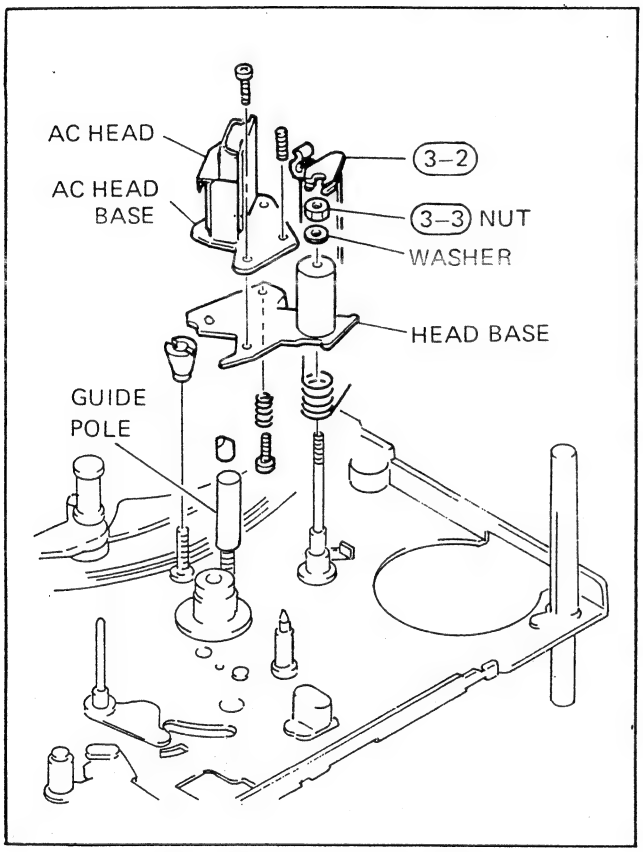


Fig. 48 Audio/Control Head

9. REMOVING THE MAIN MECHANICAL PARTS

1. Cylinder Motor
2. Loading Motor
3. Capstan Motor
4. Supply and Take-up Main Brakes
5. Sub Brake
6. Tension Band and Tension Arm
7. Supply Reel Disk
8. Take-up Reel Disk
9. Load Pulley
10. Reel Drive Idler
11. Safety Tab Switch
12. End Lamp
13. Pressure Roller
14. Pressure Roller Arm Bracket
15. Clutch Plate Assembly
16. Brake Slider
17. Capstan Flywheel
18. Mechanism State Switch
19. Reel Sensor
20. Supply and Take-up Loading Arms
21. Loading Gear Assembly

1. Cylinder Motor

1) Remove the system control PC Board while referring to "System Control PC Board Removal".

[Cylinder Motor PC Board] (Fig. 50)

2) Remove the cylinder motor PC Board fixing screw.
3) Turn the board clockwise to release it fitting with the motor case.

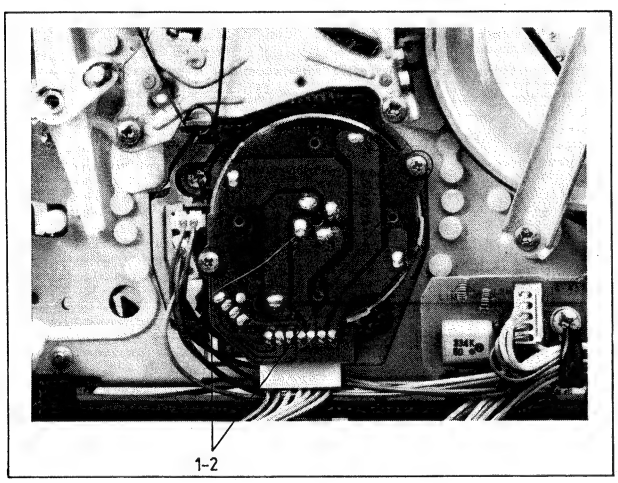


Fig. 50 Cylinder Motor PC Board

[Cylinder FG PC Board] (Figs. 51, 52)

4) Remove the motor case fixing screw.
5) Turn the case clockwise, release the fitting with the cylinder and remove the case.
6) Remove 2 rotor magnet fixing screws to remove the rotor magnet. Do not allow the rotary magnet to be attracted by other magnetic or iron materials because it is magnetized with high precision to maintain the precise rotation of the motor. When it is attracted by mistake, there is danger that its magnetization may be changed. Pay special attention in handling the FG signal generating magnet installed on the back of the rotary magnet because it has 60 poles and their magnetic force is weak.
7) Remove 3 cylinder FG board fixing screws.

* Install the cylinder motor by the reverse procedure.

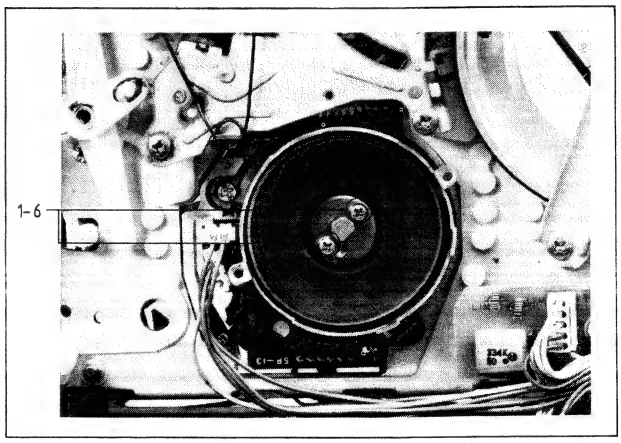


Fig. 51 Cylinder Motor (Rotor Magnet)

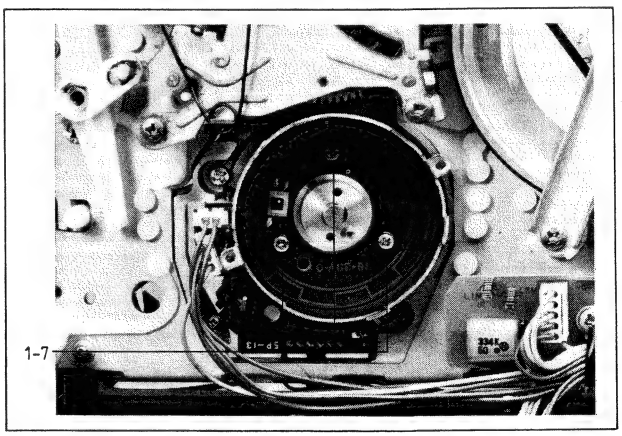


Fig. 52 Cylinger Motor (Cylinder FG PC Board)

2. Loading Motor (Fig. 53)
   1) Remove the system control PC Board while referring to "System Control PC Board Removal".
   2) Remove the loading belt.
   3) Remove the loading motor fixing screw.
   * Fit the groove in the chassis and the stopper on the bracket to install the loading motor and then fix it using screws.

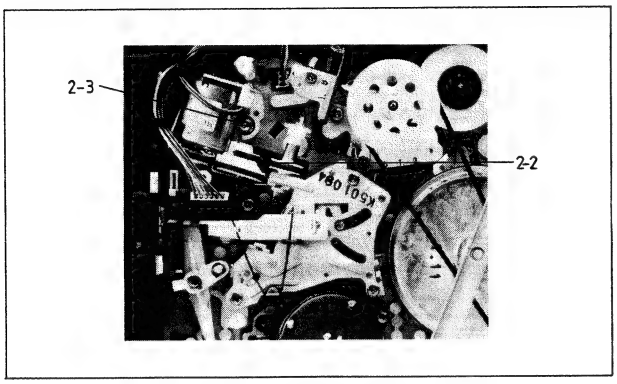


Fig. 53 Loading Motor

3. Capstan Motor (Fig. 54)
   1) Remove the system control PC Board while referring to "System Control PC Board Removal".
   2) Remove the reel belt.
   3) Remove the flywheel belt.
   4) Remove 2 capstan motor bracket fixing screws.
   * Install the capstan motor by the reverse procedure. Confirm the reference oscillation frequency Adjustment after installation.

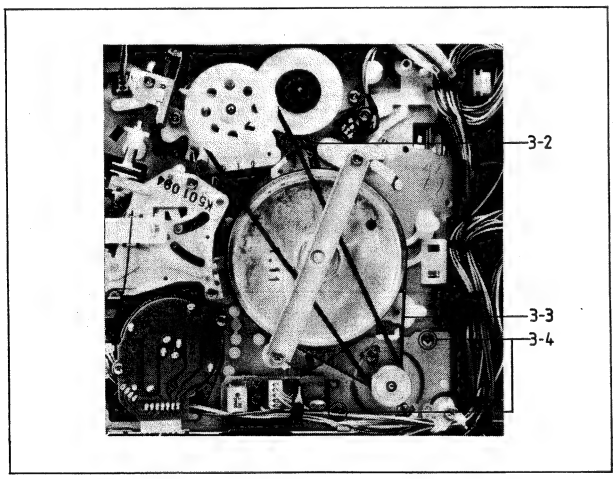


Fig. 54 Capstan Motor

4. Supply and Take-up Main Brakes (Fig. 55)
   1) Remove the springs between the supply brakes and take-up brakes.
   2) Release the fitting with the chassis.

5. Sub Brake (Fig. 55)
   1) Remove the spring between the sub chassis and brake.
   2) Release the fitting with the brake shaft.

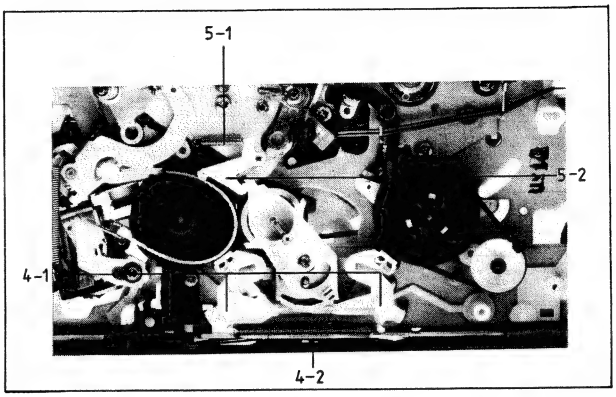


Fig. 55 Main and Sub Brakes

6. Tension Band and Tension Arm (Fig. 56)
   1) Remove the springs between the tension arm and spring holder.
   2) Remove the tension band fixing screw.
   3) Release the fitting with the tension arm to pull out the tension band and the tension arm.
   * Install the tension band and tension arm by the reverse procedure.
   - Adjust as follows after installation.
   - Tension Arm Position Adjustment
   - Back Tension Adjustment

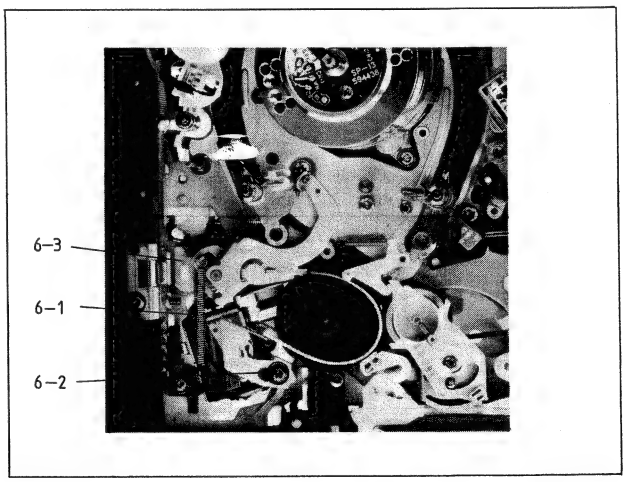


Fig. 56 Tension Band and Tension Arm

7. Supply Reel Disk (Fig. 57)

1) Remove the tension arm and tension band. (See Item 6.)
2) Remove the sub brake. (See Item 5.)
3) Remove the washer at the top of the reel disk.

* The bearing and spacer are inserted between the reel disk and chassis. Check them before installing the supply reel disk.

* Use new retaining washer for reel disk when reinstalling.

8. Take-up Reel Disk (Fig. 57)

1) Remove the belt between the reel disk and the load pulley.
2) Remove the washer at the top of the reel disk.

* The spacer is inserted between the reel disk and the chassis. Check it before installing the take-up reel disk.

* Use new retaining washer for reel disk when reinstalling.

9. Loading Pulley (Fig. 57)

1) Remove the belt between the load pulley and the reel disk.
2) Remove the washer at the top of the load pulley.

* Use new retaining washer for load pulley when reinstalling.

10. Reel Drive Idler (Fig. 57)

1) Pull the spring holder toward you to release its fitting with the reel drive idler arm shaft and then pull out the idler upward.

11. Safety Tab Switch (Fig. 57)

1) Remove the system control PC Board while referring to "System Control PC Board Removal".
2) Disconnect connector (3P) from safety tab switch.
3) Remove the safety tab switch fixing screw.

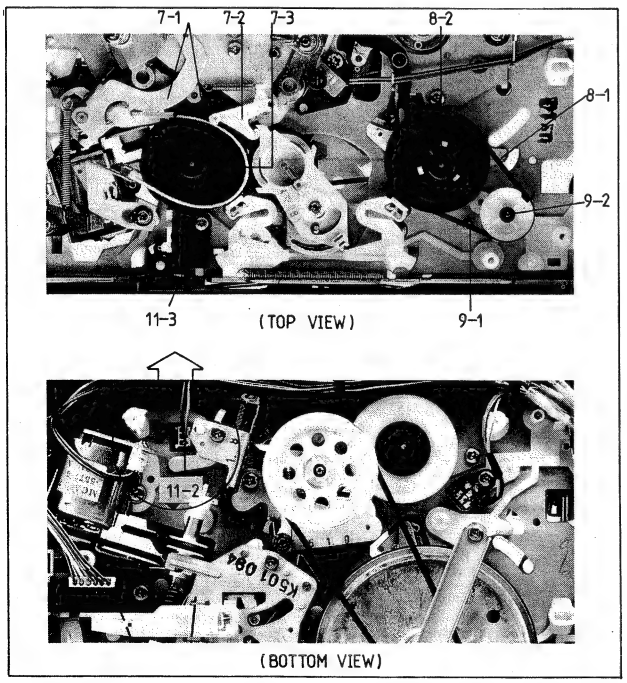


Fig. 57 Reel Tables, Load Pulley, Reel Driver Idler Safety Tab Switch

12. End Lamp (Fig. 58)

1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
2) Remove the end lamp fixing screw.

13. Pressure Roller Removal (Fig. 58)

1) Remove the shield cover while referring to "Cassette Loading Mechanism Removal".
2) Remove the pressure roller fixing screw.

* Install the pressure roller with the plastic inside of the pressure roller upward.
Check the pressure roller compression strength after installation.

14. Pressure Roller Arm Bracket (Fig. 58)

1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
2) Remove the take-up reel disk. (See Item 8)
3) Remove the washer inserted to the pressure roller arm shaft and then remove the pressure roller arm.
4) Remove the cords from the wire tie on the bracket.
5) Remove 2 bracket fixing screws.

* Install the pressure roller arm bracket by the reverse procedure while taking care of the following.
Insert the take-up brake drive arm pin into the hold in the take-up brake operation arm.
Insert the pressure roller drive arm pin into the hole in the pressure roller operation arm.
Insert the pressure roller operation link pin into the hole in the pressure roller arm.

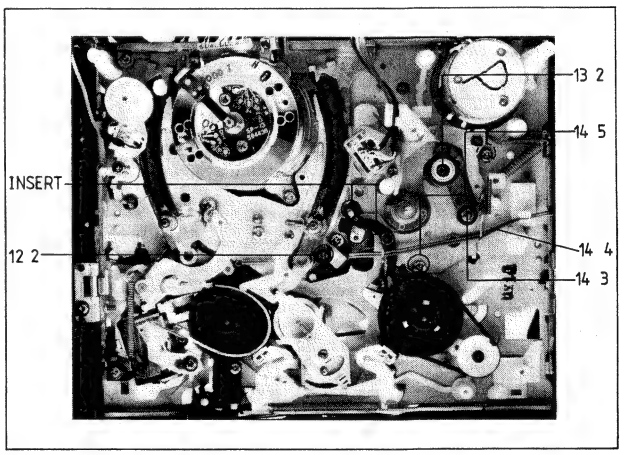


Fig. 58 End Lamp, Pressure Roller, Pressure Roller Arm Bracket

15. Clutch Plate Assembly (Fig. 59)
1) Remove the reel drive idler. (See Item 10.)
2) Remove the system control PC Board while referring to "System Control PC Board Removal".
3) Remove the reel belt.
4) Remove 2 clutch plate assembly fixing screws.
* Install the clutch plate assembly by the reverse procedure.

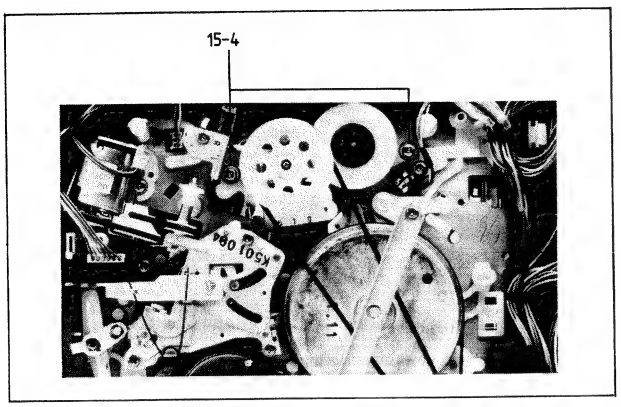


Fig. 59 Cluth Platet Assembly

16. Brake Slider (Fig. 60)
1) Remove the reel drive idler. (See Item 10.)
2) Remove the system control PC Board while referring to "System Control PC Board Removal".
3) Remove the clutch plate. (See Item 15.)
4) Remove the brake slide fixing screw.
* Insert the brake drive arm pin into the groove of the slider operation section to install the brake slider.

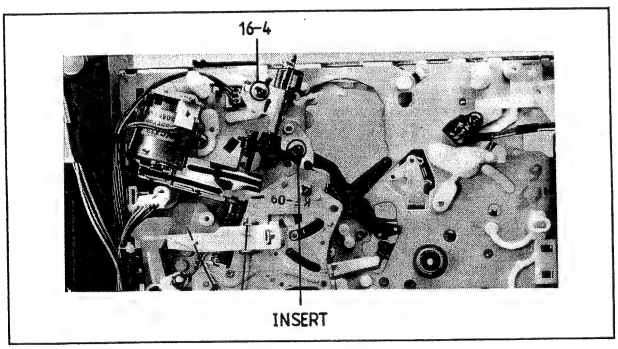


Fig. 60 Brake Slider

17. Capstan Flywheel (Fig. 61)
1) Remove the system control PC Board while referring to "System Control PC Board Removal".
2) Remove 2 flywheel bracket fixing screws to remove the flywheel support plate.
3) Remove the reel belt and flywheel belt.
4) Pull out the flywheel while taking care of the oil shield washer on the capstan shaft.
* Insert the capstan flywheel by the reverse procedure. A washer is inserted on the flywheel of the capstan shaft.
Confirm the reference oscillation frequency adjustment after installation.
Check it before installation.

18. Mechanism State Switch (Fig. 61)
1) Remove the system control PC Board while referring to "System Control PC Board Removal".
2) Remove the mechanism state switch fixing screw and lift the screw hole side to release the fitting with the chassis.
* Fit the switch lever to the groove in the slider to screw the lever when installing the switch.
Adjust the mechanism state switch after installation.

19. Reel Sensor (Fig. 61)
1) Remove the system control PC Board while referring to "System Control PC Board Removal".
2) Remove the reel sensor PC Board fixing screw.

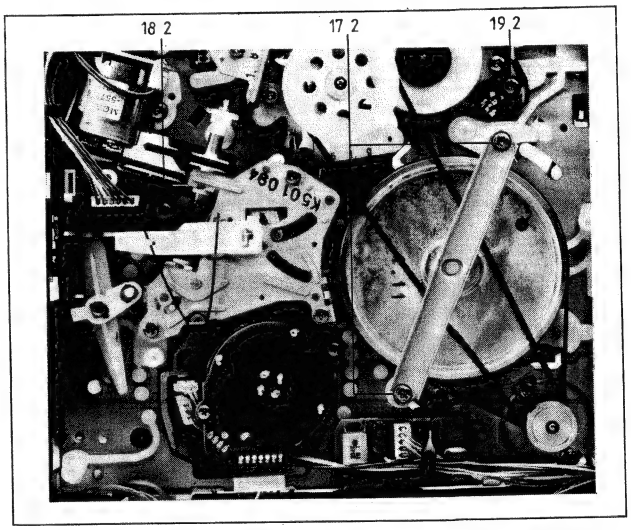


Fig. 61 Capstan Flywheel, Mechanism State Switch Reel Sensor

20. Supply and Take-up Loading Arms (Fig. 62)
1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
2) Remove the tension band and tension arm. (See Item 6.)
3) Remove the sub brake. (See Item 5.)
4) Remove 3 sub chassis fixing screws and remove the sub chassis, guide pole and inclined guide together with the base.

* Install the supply and take-up loading arms by the reverse procedure fit the loading gear stopper and loading arm groove when installing the loading.

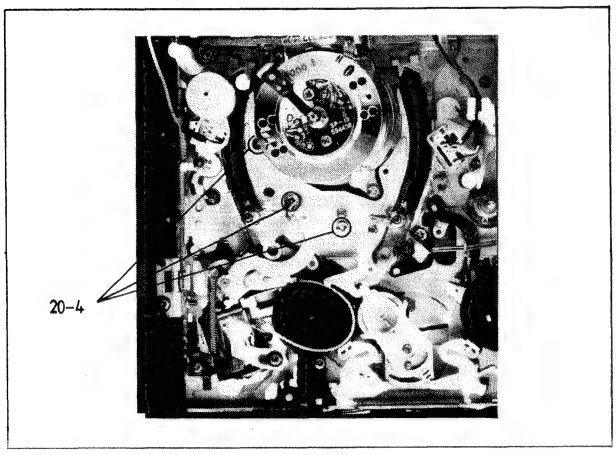


Fig. 62 Supply and Take-up Loading Arms

21. Loading Gear Assembly (Figs. 63, 64)
1) Remove the cassette loading mechanism while referring to "Cassette Loading Mechanism Removal".
2) Remove the reel drive idler. (See Item 10.)
3) Remove 2 screws on the sub chassis.
4) Remove the system control PC Board while referring to "System Control PC Board Removal".
5) Remove the capstan flywheel. (See Item 17.)
6) Remove the clutch plate. (See Item 15.)
7) Remove the brake slider. (See Item 16.)
8) Remove the mechanism state switch. (See Item 18.)
9) Remove the spring from the loading gear assembly.
10) Release the fitting with the loading gear assembly to remove the switch slider.
11) Release the fitting between the tension release arm and the chassis to remove the tension release arm.
12) Remove the loading belt.
13) Remove 3 loading gear assembly fixing screws.

* Install the loading gear assembly in the reverse procedure while paying attention to the following.

- Insert the take-up brake drive arm pin into the hole in the take-up brake operation arm.
- Insert the pressure roller drive arm pin into the hole in the pressure roller operation arm.

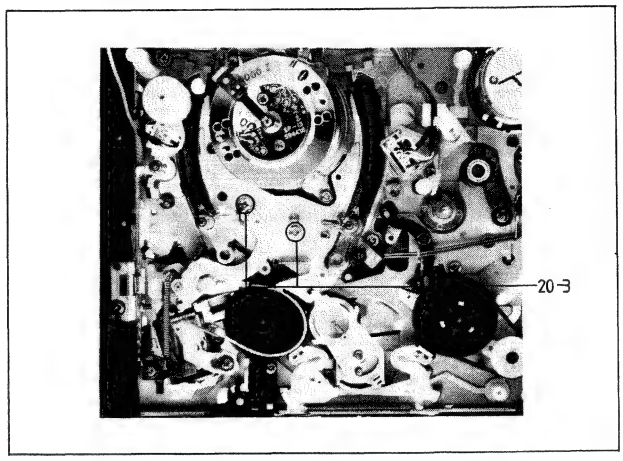


Fig. 63 Loading Gear Assembly

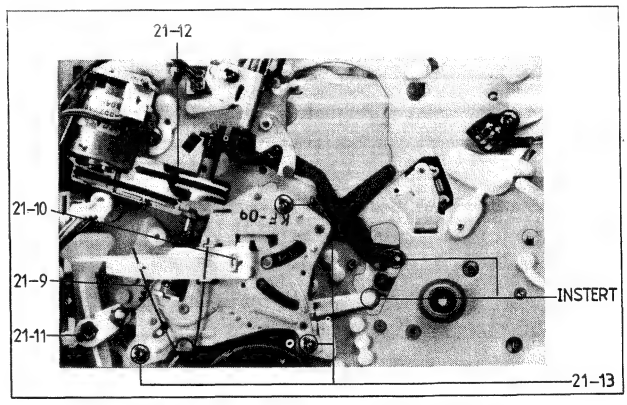


Fig. 64 Loading Gear Assembly

1. SERVO CIRCUIT ADJUSTMENT

Remove the bottom cover, place the VTR with the left down and perform the adjustment by the following procedure.

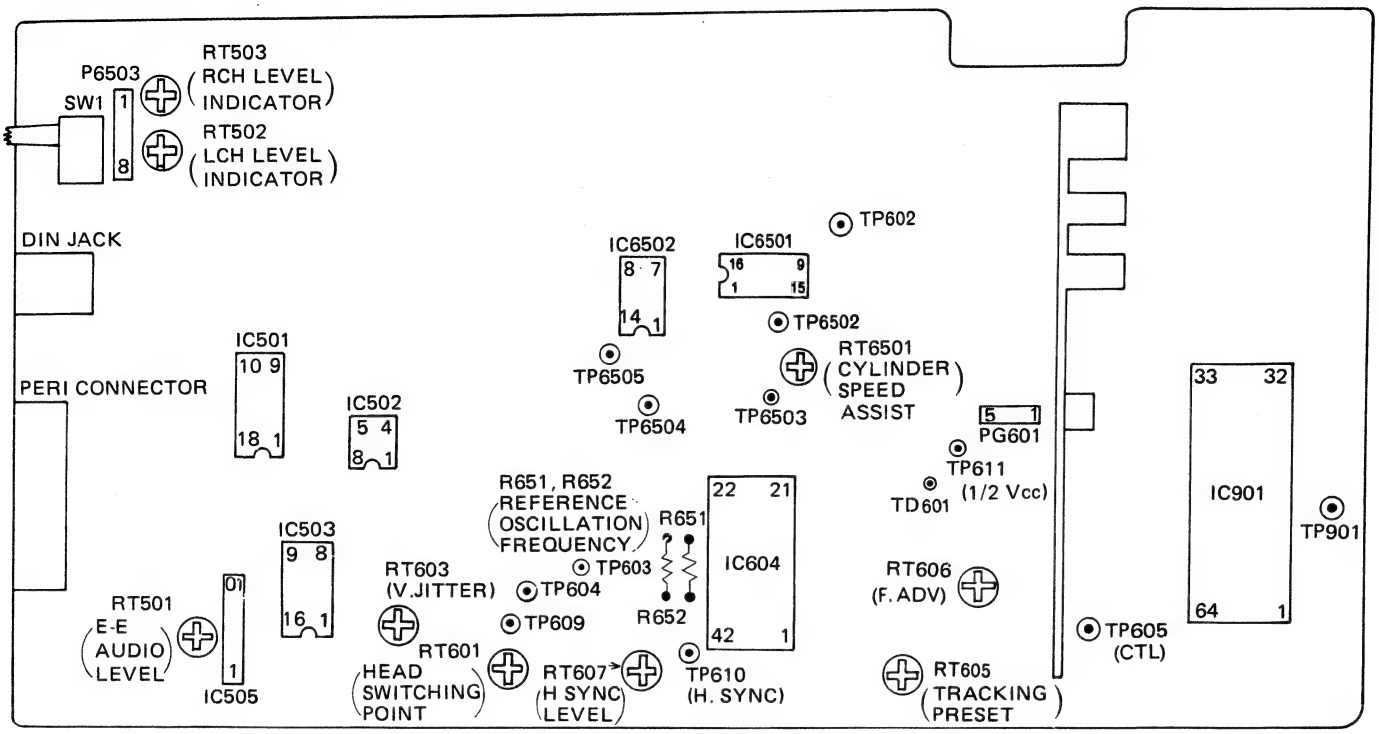


Fig. 1 Servo/System Control (Main) P.C. Board (Parts Side)

1. Cylinder Speed Assist Adjustment: RT6501

This adjustment reduces horizontal jitter on the screen in play mode.

1) Connect the colour bar signal generator to the peri connector (video input) on the rear panel or receive a TV program.
2) Connect the channel-1 of the oscilloscope to the TP6503 and channel-2 to TP6504.
3) Short-circuit test point terminals the TP601 and TP6505 on the P.C. Board.
4) Load a blank tape and record mode.
5) Set the AC/GND/DC select switch of the oscilloscope to "GND" and align the ground lines of the channels 1 and 2.
6) Set the AC/GND/DC select switch of the oscilloscope to "DC" and adjust the RT6501 (Cylinder speed control) to equalize the voltages of channels 1 and 2.

Note: Set the probe to 10 : 1 for use.

2. Reference Oscillation Frequency Adjustment: R651, R652

This adjustment fine tunes the reference oscillation frequency (REF 25 Hz) in the phase control system to correct the rotation transmission loss caused by uneveness of the diameters of the flywheel and puliey, etc. When this adjustment is incomplete, noise appears in the picture or correct tracking is not achieved.

1) Connect the frequency counter to the peri connector (audio output) on the rear panel.
2) Short-circuit test point terminals TP601 and TP609 to place only the phase control system (IC604) in the record mode.
3) Play back the alignment tape. (3 kHz AUDIO)
4) Check that the reading of the frequency counter is 3000 Hz ± 15 Hz. When it is more than 3015 Hz, omit R651. On the other hand, when it is less than 2985 Hz, omit R652.

Note: There are some units with R651 or R652 omitted on shipment from the factory.

3. Head Switching Point Adjustment: RT601

This adjustment determines the switching point of the video head during playback. When this adjustment is incomplete, the FM signal is degraded and the switching noise appears in the picture or H/V jitter is generated.

1) Connect channel-1 of the oscilloscope to test point terminals TP603 (SW25Hz output) and TP216 (GND) on the Y/Chroma P.C. Board, and channel-2 to the peri connector (video output) on the rear panel.
2) Connect the monitor TV to the RF OUT jack on the rear panel.
3) Play back the alignment tape.
4) Set the sync slope switch of the oscilloscope to "-" to adjust the CH1 phase. Then adjust RT601 so that the trailing edge of the SW25Hz signal is 6.5H ± 0.5H before the vertical sync in the video signal.

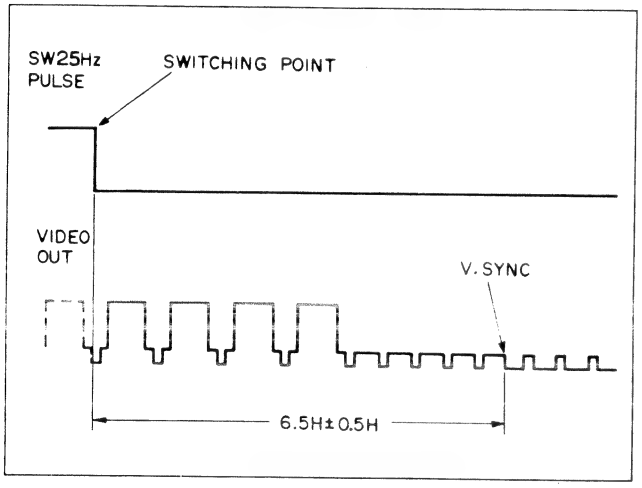


Fig. 2 Head Switching Point

4. Tracking Preset Adjustment: RT605

This adjustment optimizes tracking when playing back tape recorded on this VTR. When this adjustment is incomplete, noise is conspicuous in the played back picture with the tracking control set to the center click position or noise may not be removed with the tracking control slided.

1) Connect the colour bar signal generator to the peri connector (video input) on the rear panel or recieve a TV program.
2) Connect channel-1 of the oscilloscope to the TP603 (SW25Hz) and channel-2 to TP605 (CTL).
3) Set tracking control RV121 to the click position, and record for a few minutes. Then play back this section.
4) Trigger channel-1 of the oscilloscope.
5) Adjust RT605 so that the CTL pulse peak is delayed from the SW25Hz synchro phase by 0.5m sec±0.1m sec.
6) Observe the monitor picture, and the tracking control (RV121) left and right centered on the click position and check that the S/N is optimum at the click position.

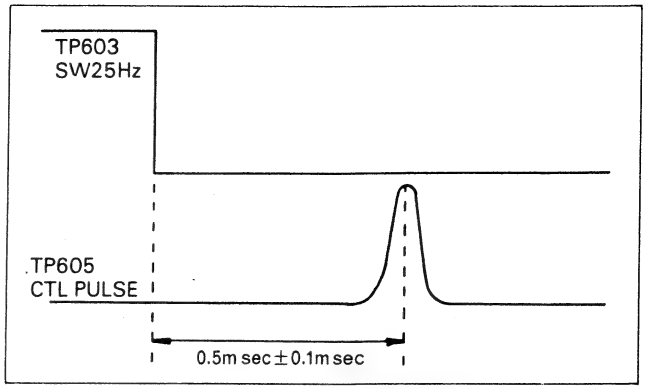


Fig. 3 Tracking Preset

5. H. Sync Level Adjustment: RT607

This adjustment sets the H. sync level to the specified value.

1) Connect channel-1 of the oscilloscope to the TP610 (1/2 Vcc) and channel-2 to the TP611 (SYNC).

* Note: ° Set the CH-1 and CH-2 gain positions of the oscilloscope to 50mV/div. and align the GND levels.
° Set the probe of the oscilloscope to 10 : 1.

2) Play back the alignment tape.
3) Adjust RT607 so that the DC level of H. Sync is 100 ±50 mV higher than that of 1/2 Vcc shown in Fig. 4.

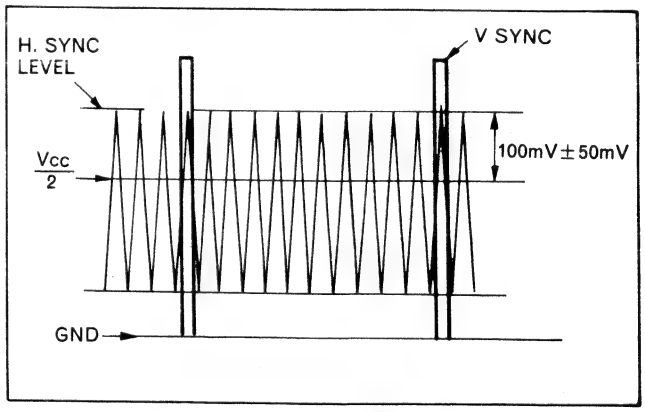


Fig. 4 H. Sync Level

6. Frame Advance Adjustment: RT606

This adjustment regulates advancing of the pictures in the frame advance mode.

1) Connect the monitor TV to the RF OUT Jack on the rear panel.
2) Connect the Oscilloscope to the TP605
3) Playback the allgnment tape and set the unit to the play pause mode.
4) Adjust RT606 so that 15~20 frames advance every 10 sec when the STEP (Frame Advance) key on the remote control is held down.

7. V. Jitter Adjustment: RT603

This adjustment eliminates vartical jitter and noise in the still picture.

1) Connect the colour bar signal generator to the peri connector (video input) on the rear panel or receive a TV program.
2) Connect the monitor TV to the RF OUT jack on the rear panel.
3) Record for a few minutes. Playback the recorded signal in the still mode.
4) Adjust RT603 while observing the monitor TV so that vertical jitter in the picture stops.

8. Level Indicator Adjustments: RT502, RT503

These adjustments set the level meter indications. If these adjustments are incomplete, the Lch input level is not the same as the Rch input level.

1) Set the input select switch on the front of the VTR to "EXTERN" (DIN input) and the Lch -- Rch select switch to the "L + R" position.
2) Connect the oscillator to the Lch – Rch audio input DIN jack and supply a 50mVrms, 1kHz signal.
3) Set the RECORD VOLUME control to MAX.
4) Adjust RT502 (L-CH LEVEL INDICATOR) to light the level indicator from the lowest segment in sequence and stop turning RT502 when one red LED (0 dBm indicator) lights.
5) Adjust RT503 (R-CH LEVEL INDICATOR) to light the level indicator from the lowest segment in sequence and stop turning RT503 when one red LED (0 dBm indicator) lights.
6) Load the VTR with a blank tape and record the 50mVrms, 1kHz signal.
7) Rewind the recorded tape and play it back. Check that on red LED (0 dBm indicator) lights for each channel. If it does not, readjust the level indicator for both L and R channels.

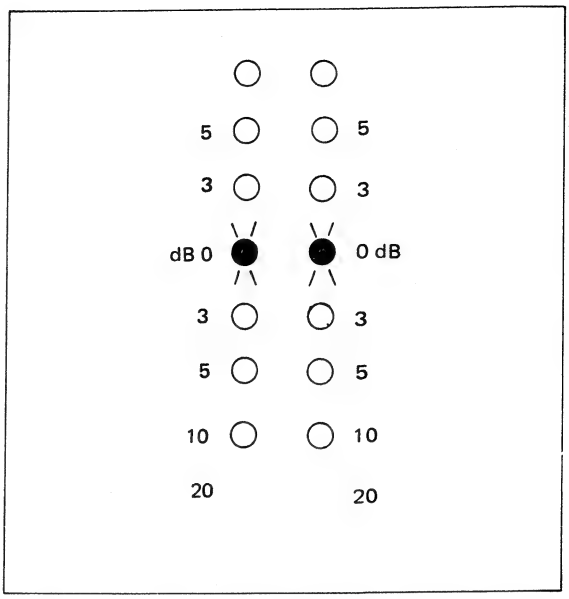


Fig. 6 Level Indicator ... 0dB Indicator Light;

2. Y/CHROMA CIRCUIT ADJUSTMENT

Removing the bottom cover, place the VTR with the left down and perform the adjustment by the following procedure.

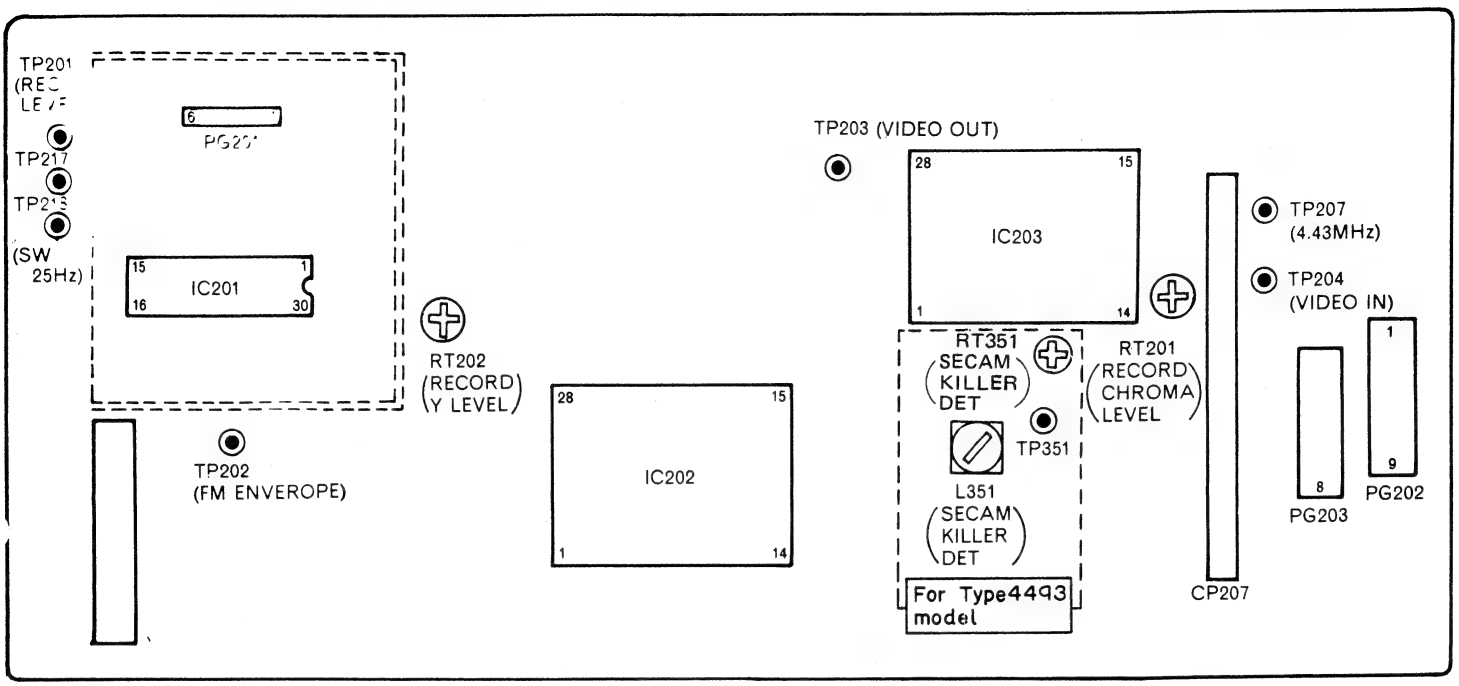


Fig. 7 Y/Chroma P.C. Board (Parts Side)

1. Record Chroma Level Adjustment : RT201

This adjustment optimizes the chroma level during recording.

When this adjustment is incomplete and the level is too high, diamond beats can be seen in the picture, and when the level is too low, the chroma S/N ratio deteriorates and coloring becomes poor. The optimum record chroma level differs depending on the figure stamped on the section shown on the upper cylinder (video head).

Perform this adjustment when replacing the video heads and the parts in the Y/Chroma signal system.

Connecting test equipment

1) Connect the color bar signal generator to the peri connector (video input) on the rear panel.
2) Connect the oscilloscope to TP201 on the Y/Chroma board.
3) Load the VTR with a blank tape and place in the record mode.

Adjustment procedure

1) Turn RT202 fully counterclockwise so that the Y signal level is minimum.
2) Adjust RT201 so that the record chroma level shown in Fig. 9 is set to the value specified in Fig. 8.
3) Adjust the record Y level after this adjustment is completed.

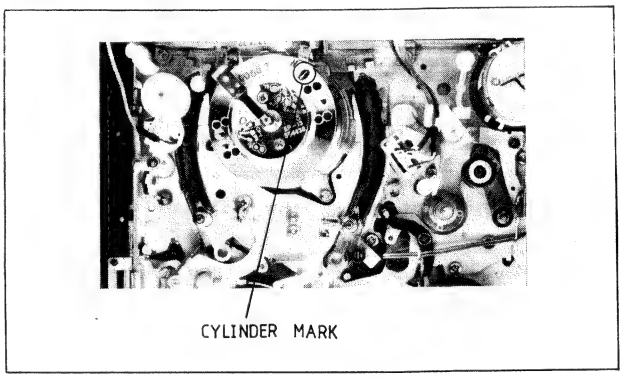


Fig. 8 Cylinder Mark

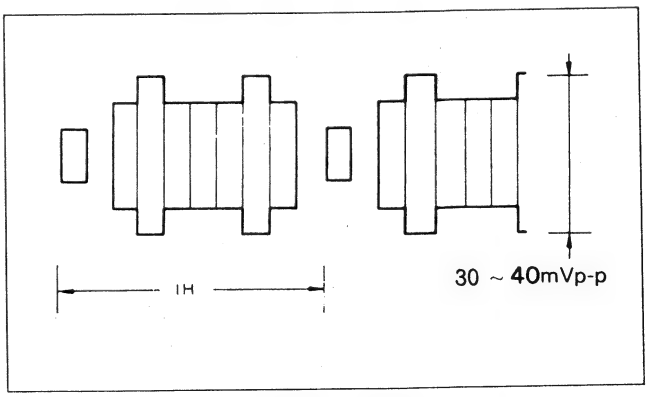


Fig. 9 Record Chroma Level

Cylinder mark	Level
0	30 mVp-p
1	30 mVp-p
2	35 mVp-p
3 ~ 4	40 mVp-p

Table-1 Record Chroma Level

2. Record Y Level Adjustment : RT202

This adjustment optimizes the Y level during recording. When this adjustment is incomplete and the level is too high, the black and white inversion phenomenon may occur or S/N deteriorates causing a rough picture. On the other hand, when the level is too low, the S/N deteriorates.

1) Connect the same as shown in the previous item "Record Chroma Level Adjustment".
2) Load the machine with a blank tape and place in the record mode.
3) Adjust RT202 so that the Y level at sync tip is 100 mV ± 5 mV.

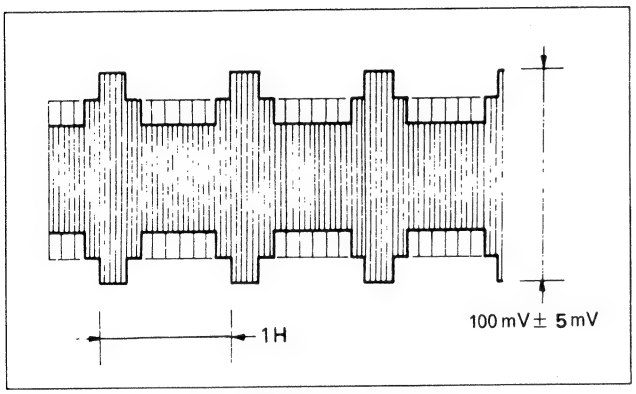


Fig. 10 Record Y Level

[For Type 4493 model]

3. Adjustment Secam Killer Level: RT351·L351

This adjustment sets the secam killer level to the specified value.

1) Supply a video signal (SECAM colour-bars) to peri connector (video input) on the rear panel.
2) Connect the oscilloscope to the test point terminal TP351.
3) Set the unit to the EE mode.
4) Turn the RT351 fully counterclockwise so that the sine wave about 7.8 kHz is to be min.
5) Turn the L351 so that the sine wave is to be max.
6) Turn the RT351 again so that the level of sine wave is 5.0Vp-p ± 0.1Vp-p.
7) In case of the level of sine wave is over 5.0Vp-p even the RT351 fully counter clockwise, turn the L351 clockwise so that the level of sine wave is 5.0Vp-p.

3. FM AUDIO CIRCUIT ADJUSTMENT

Perform the following adjustments after removing the top cover and setting the VTR horizontal.

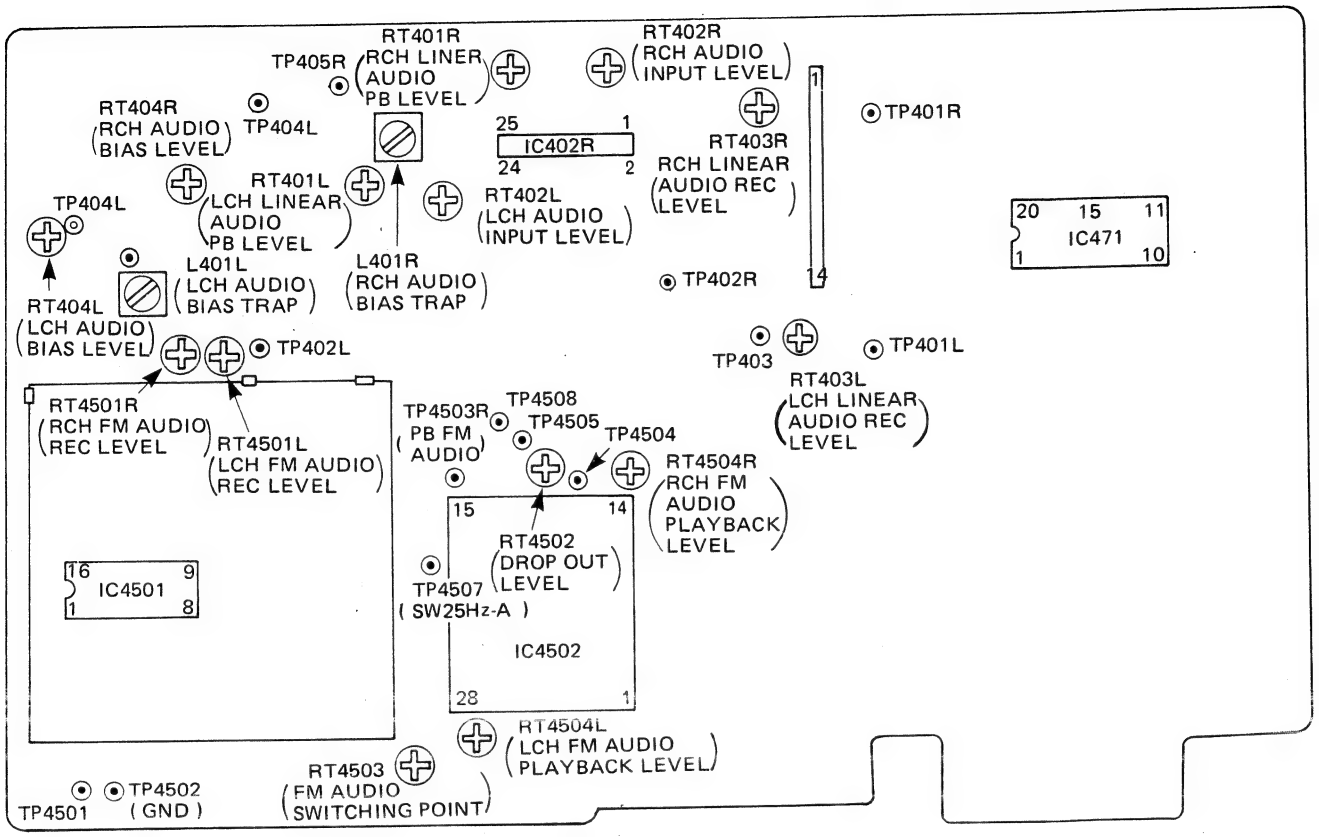


Fig. 9 FM Audio Board (Solder Side)

1. FM Audio Head Switching Point Adjustment: RT4503

This adjustment sets the switching point of the FM audio heads to the centre where the CH1 and CH2 envelopes overlap in the play mode. If this adjustment is incomplete, the envelope is degraded and noise appears.

1) Connect channel-1 of the oscilloscope to TP4507 SW25Hz-A).
2) Connect channel-2 of the oscilloscope to TP4503L, R (FM audio envelope).
3) Connect external trigger probe of the oscilloscope to TP4508 (SW25Hz).

4) Playback the Hi-Fi alignment tape.
5) Observe the waveforms at TP4507 (SW25 Hz-A) and TP4503L, R (FM audio envelope).
6) Adjust RT4503 so that leading or trailing edge of the SW25 Hz-A signal is set to the center of the FM audio envelope and dropout is not present. If the dropout cannot be cancelled, minimize it (less than 0.5H).

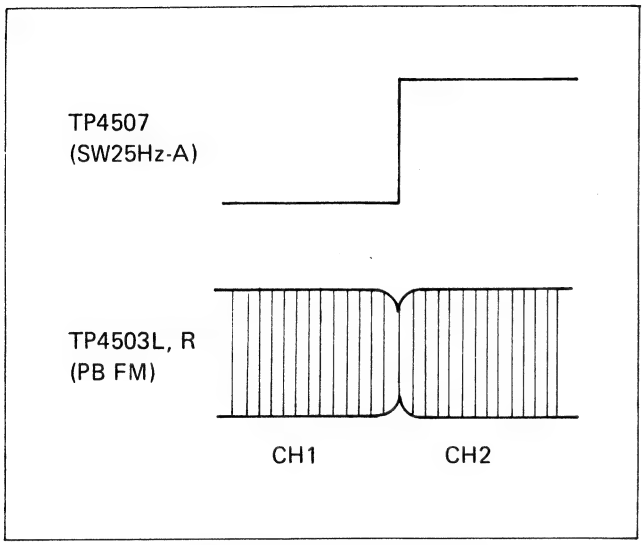


Fig. 10 FM Audio Switching Point

* Readjust this FM audio switching point when the switching point in the servo circuit is adjusted.

2. FM Audio Playback Level Adjustment: LCH: RT4504-L, RCH: RT4504R

These adjustments set the Lch and Rch outputs to the specified values.

1) Connect the VTVM to the Lch, Rch audio output jack on the rear panel.
2) Playback the Hi-Fi alignment tape.
3) Adjust RT4504L (Lch) and RT4504R (Rch) respectively so that the reading of the VTVM is –4.8 dBm.

3. Dropout Adjustment: RT4502

This adjustment sets the dropout detection level of the FM audio signal.

If this adjustment is incomplete and the level is too high, the dropout detector responds to small dropouts in the envelope and noise may appear. On the other hand, if the level is too low, dropouts cannot be compensated the Hi-Fi audio may not be muted when the tracking control is turned, or Hi-Fi audio may not be switched to linear audio when the envelope is missing.

1) Connect the DC voltmeter to test point terminal TP4506.
2) Playback the alignment tape. (not be recorded Hi-Fi alignment.)
3) Adjust RT4502 so that the voltmeter reads 3.3± 0.1V.

4. FM Audio Record Level Adjustment

Lch FM Audio Rec Level: RT4501L
Rch FM Audio Rec Level: RT4501R

This adjustment sets the record current. If this adjustment is incomplete and the level is too high, the video S/N deteriorates and when the level is too low, the audio (Hi-Fi) S/N deteriorates.

1) Connect the oscilloscope to test point terminal TP4501 and TP4502 (GND).
2) Load a blank tape and set the VTR to the no signal record mode in the SP mode.
3) Turn RT4501R fully clockwise to minimize the Rch output signal.
4) Adjust RT4501L so that the oscilloscope reads 55 mVp-p.
5) Adjust RT4501R so that the oscilloscope reads 210 mVp-p.

LINEAR AUDIO CIRCUIT ADJUSTMENT

5. Audio Input Level Adjustment: RT402L, RT402R

Optimum input level is regulated by this adjustment. When adjustment is not complete and level is too high, distortion is likely to occur; on the other hand, when level is too low, hissing noise becomes conspicuous, and also the noise reduction effect is degarded.

R-ch audio input level: RT402R

1) Connect audio signal generator (1kHz : −2dB) to the peri connector (R-ch audio input) and apply audio signal.
2) Connect the VTVM to the R-ch TP401R.
3) Set the VTR to E-E mode.
4) Adjust RT402R (R-CH INPUT LEVEL) so that the reading of the VTVM is 210mV±10mV.

L-ch audio input level: RT402L

1) Connect audio signal generator (1kHz : −2dB) to the peri connector(L-ch audio input) and apply audio signal.
2) Connect the VTVM to the L-ch TP401L.
3) Adjust RT402L (L-CH INPUT LEVEL) so that the reading of the VTVM is 210mV±10mV.

6. Linear Audio Playback Level Adjustment: RT401R, RT401L

The playback level is regulated by this adjustment. When adjustment is not complete and level is too low, the playback level drops and when the level is too high, the playback level becomes higher.

Audio R-ch playback level: RT401R

1) Connect the VTVM to the peri connector (R-ch audio output) on the rear panel.
2) Playback the 1kHz audio track section of the alignment tape.
3) Adjust RT401R (R-CH PLAYBACK LEVEL) so that the reading of the VTVM is −5±1dB.

Audio L-ch playback level: RT401L

1) Connect the VTVM to the peri connector L-ch audio output jack on the rear panel.
2) Playback the 1kHz audio track section of the alignment tape.
3) Adjust T401L (L-CH PLAYBACK LEVEL) so that the reading of the VTVM is −5±1dB.

8. Audio Record Level: RT403R, RT403L

Optimum record level is regulated by this adjustment. When adjustment is not complete and the level is too high, distortion is likely to occur; on the other hand, when the level is too low, hissing noise becomes conspicuous, and also the noise reduction effect is degraded.

R-ch record level: RT403R

1) Connect VTVM to TP403R and connect audio signal generator (1kHz , −2dB) to the peri connector (R-ch audio input).
2) Adjust RT403R (R-CH RECORD LEVEL) so that the reading of the meter is −29dB±0.5dB.
3) Disconnect the VTVM and connect it to the peri connector (R-ch audio output).
4) Load the VTR with a blank tape and place it in the record mode for few minutes.
5) Playback the recorded section and confirm the reading of the meter to −2dB±0.5dB.
6) If it is not, readjust RT403R with calibrating the audio record level at TP403R as shown below.
   Example: The reading at the output jack is −10dB. Then the reading at TP402R is − 4 dB (−29−(−2)).

L-ch record level: RT403L

1) Connect VTVM to TP402L and connect audio signal generator (1kHz , −2dB) to the L-ch audio input jack.
2) Adjust RT403L (L-CH RECORD LEVEL) so that the reading of the meter is −29dB±0.5dB.
3) Disconnect the VTVM and connect it to the L-ch audio output jack.
4) Load the VTR with a blank tape and place it in the record mode for few minutes.
5) Playback the recorded section and confirm the reading of the meter to −2dB±0.5dB.
6) If it is not, readjust RT402L with calibrating th audio input level as shown below.
   Example: The reading on TP402L is − 4 dB. Then the input at the reading at TP402L is −27dB (=−29−(−2)).

9. Audio Bias Trap Adjustments

L-ch Audio Bias Trap: L401L,
R-ch Audio Bias Trap: L401R

This adjustment prevents bias current from flowing to the audio processing system. When this adjustment is incomplete, the audio S/N deteriorates and sound is distorted.

Connecting test equipment

1) Connect the VTVM to TP402L, R.

VTR Condition

2) Load a blank tape and set the VTR to the record mode.

Adjustment procedure

3) Adjust L401L, R (Audio Bias Trap) to minimum reading.

4. MULTIPLEX DEMODULATOR CIRCUIT ADJUSTMENT (For Type 4493 model)

Remove the top cover set the VTR horizontal and follow the adjustment procedure shown below.

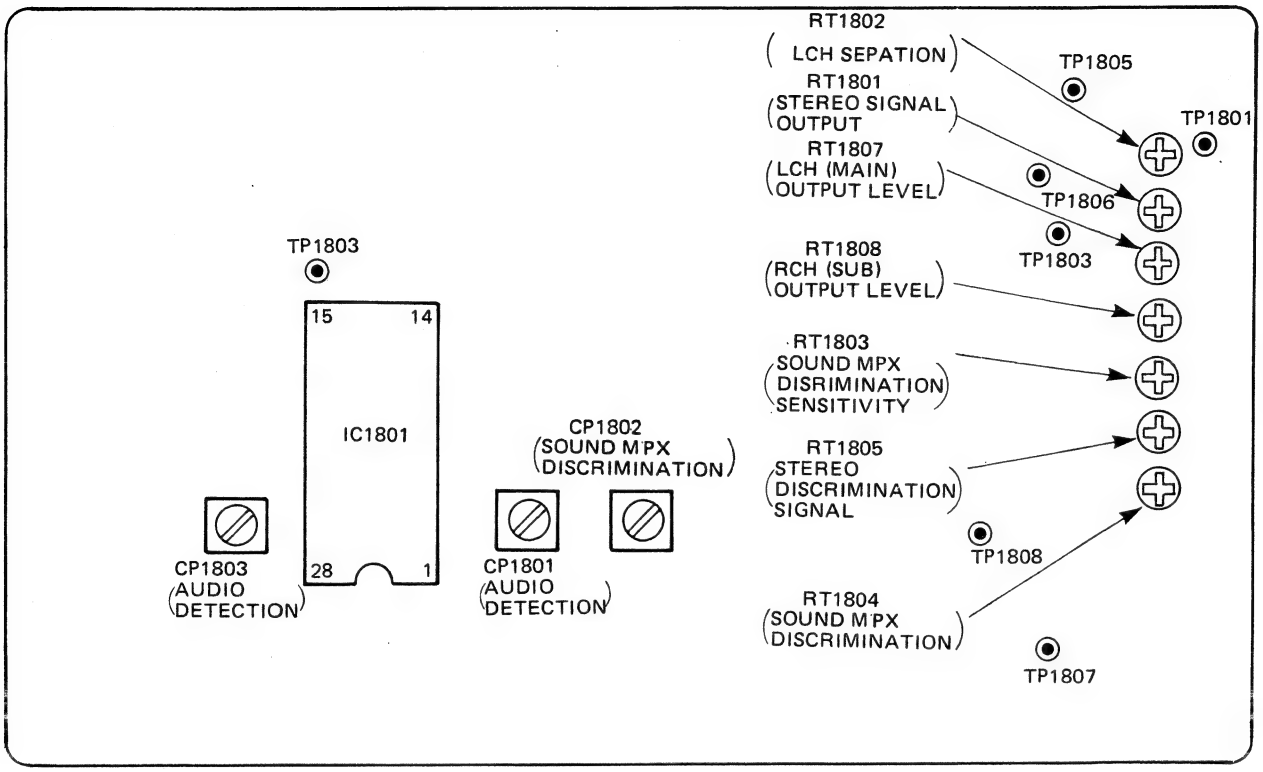


Fig. 11 Demodulator P.C. Board (Parts Side)

Note: 1. Set all the semi-variable resistors on the demodulator board to around the center of their variable ranges.
2. Set the audio channel select switch to "CH1 + CH2".

1. Audio Detection Adjustment: CP1801, CP1803

1) Connect the oscilloscope and distortion meter to TP-1801 and TP1802.
2) Receive a bilingual broadcast.
3) Adjust CP1801 and CP1803 to maximize the output and fine adjust so the distortion is minimum.

2. Stereo Discri Signal Adjustment: RT1805

1) Connect the oscilloscope to test point terminal TP-1804.
2) Receive a stereo broadcast.
3) Adjust RT1805 to maximize the stereo distrimination signal (117.5Hz) output.

3. Sound M.P.X. Discri Signal Adjustment: RT1805

1) Connect the oscilloscope to test point terminal TP-1804.
2) Receive a bilingual broadcast.
3) Adjust RT1804 to maximize the sound multiplex discrimination signal (274.1Hz) output.
4) And adjust CP1802 to maximize the sound multiplex discrimination signal (274.1Hz) output.

4. Sound M.P.X. Discri Sensitivity Adjustment: RT1803

1) Connect the oscilloscope to test point terminal TP-1803.
2) Receive a bilingnual broadcast.
3) Turn RT1803 from minimum (fully counterclockwise) to maximum (fully clockwise) and set it to the position where the output at TP1803 (shown in the figure) changes from Low to High.

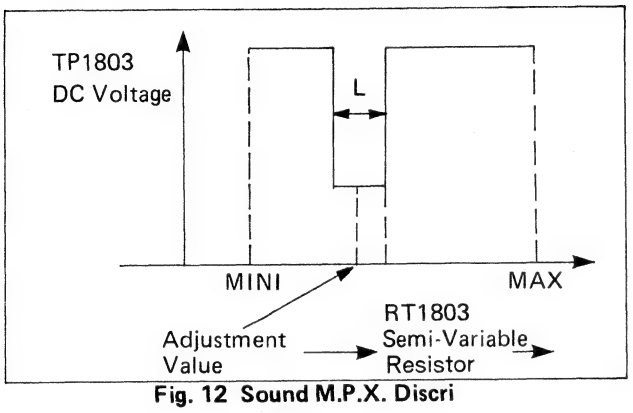


Fig. 12 Sound M.P.X. Discri

5. Stereo Signal Output Level Adjustment

1) Receive a stereo signal (400Hz/15kHz div.)

R-ch output level: RT1801

2) Connect the VTVM to TP1806 (R-ch)
3) Set the CH1 + CH2 select switch on the operation circuit board to "CH2" so only the L-ch signal is output.
4) Adjust RT1801 so the output level is 138mV.

6. L-ch Separation Adjustment: RT1802

1) Connect the oscilloscope to test point terminal TP-1807.
2) Receive a stereo broadcast.
3) Switch off the modulation of L-channel.
4) Adjust RT1802 to minimize the R-ch signal output.

7. L-ch (Main)/R-ch (Sub) Output Level: RT1807 (L-ch Main), RT1808 (R-ch Sub)

1) Connect the VTVM to test point terminal TP1807 (L-ch).
2) Receive a monaural broadcast.
3) Adjust RT1807 (L-ch) and RT1808 (R ch) so they are both --15±0.5dBm.

3. TIMER CIRCUIT ADJUSTMENT (For Type 4493 model)

Perform adjustment after removing the front cover.

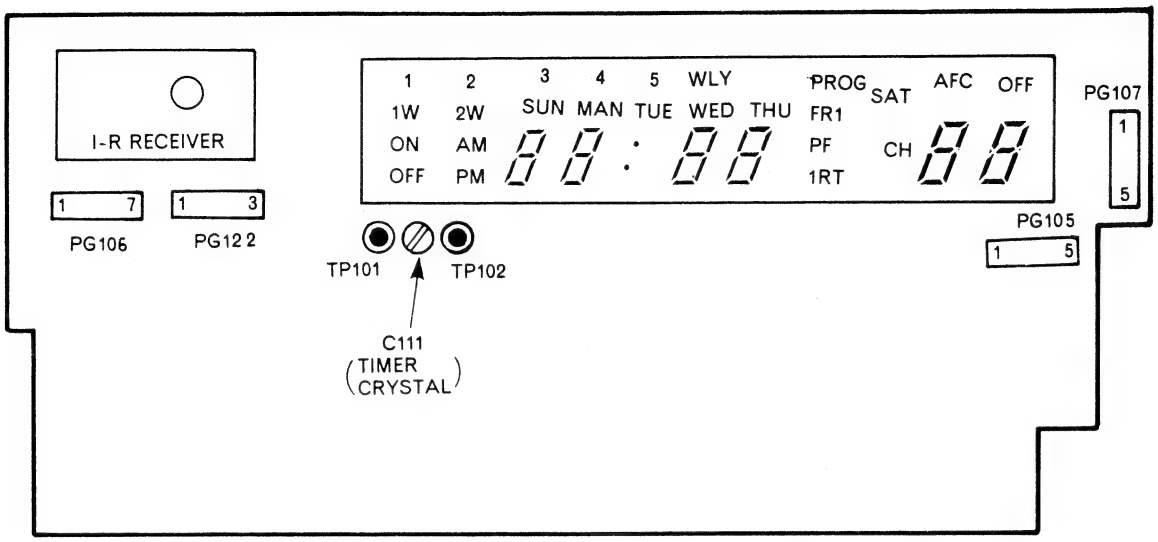


Fig. 13 Timer P.C. Board (Parts Side)

1. **Timer Crystal Adjustment: C111**
   1) Connect a frequency counter to the test point terminals TP101 and TP102 (GND).
   2) Set the unit to the STOP mode.
   3) Set the GATE TIME of the frequency counter to 10 sec and adjust so that the frequency counter reading is 32.7680 kHz.

4. TUNER/IF CIRCUIT ADJUSTMENT (Type 4491 model)

Perform adjustment after removing the top cover.

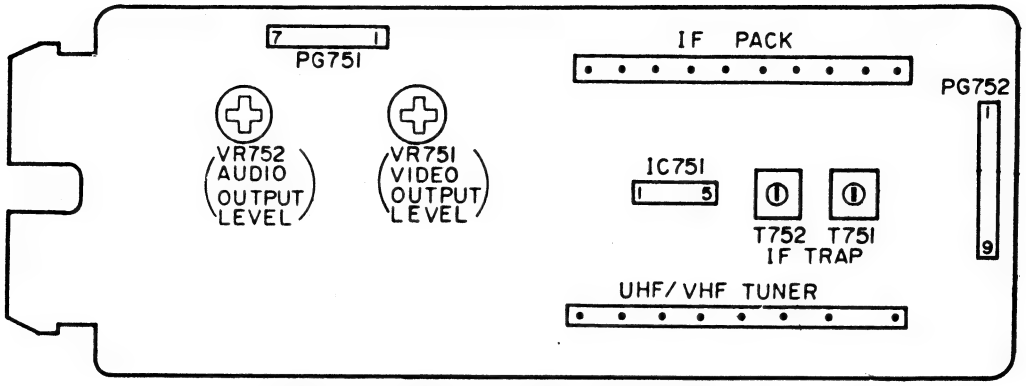


Fig. 14 Tuner/IF P.C. Board (Parts Side)

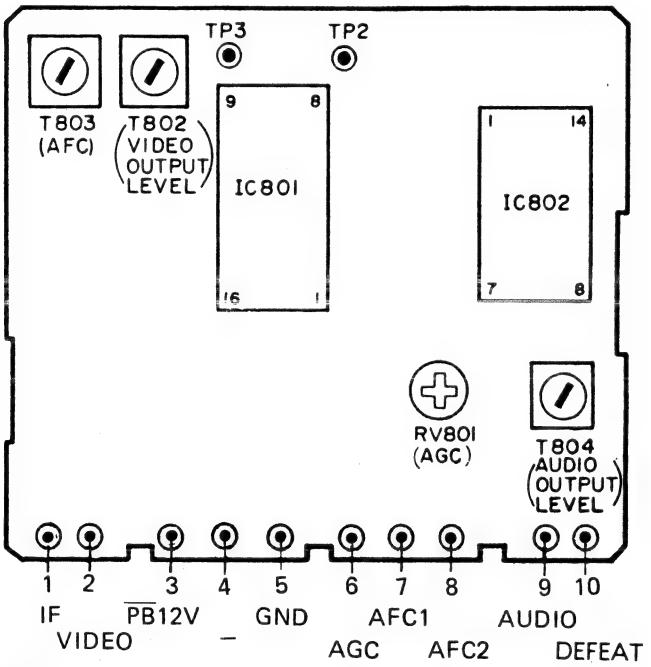


Fig. 15 IF P.C. Board (Parts Side)

1. IF Trap Adjustment: T751 T752

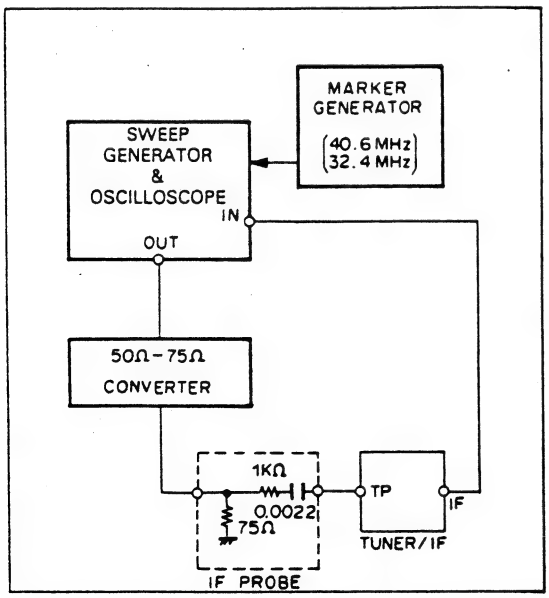


Fig. 16

1) Connecting test equipment
2) Set the unit to the EE mode.
3) For trap adjustment, turn to adjust T751 and T752 on the tuner/IF board to obtain to obtain 32.4 ± 0.05MHz and 40.6 ± 0.05MHz respectively.

2. IFT Adjustment: IFT (Tuner pack board)

1) Connecting test equipment.

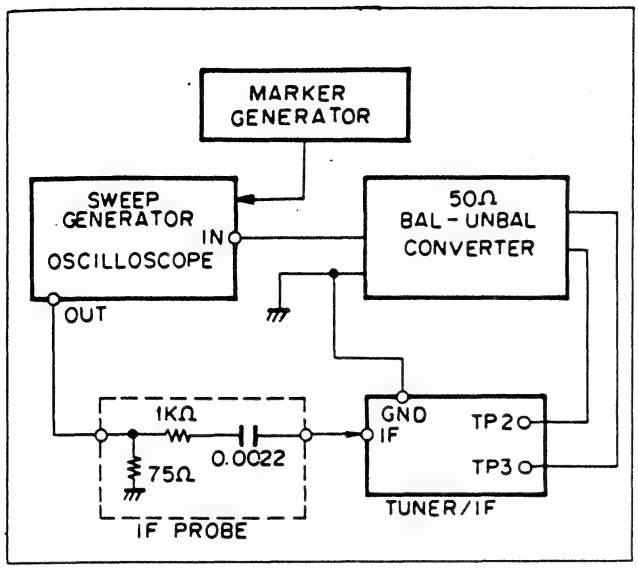


Fig. 17

2) Set the unit to the E-E mode.
3) Adjust the generator output so that the output waveform does not deviate.
4) Adjust the IFT on the tuner pack board so that the waveform shown in the diagram below is obtained.

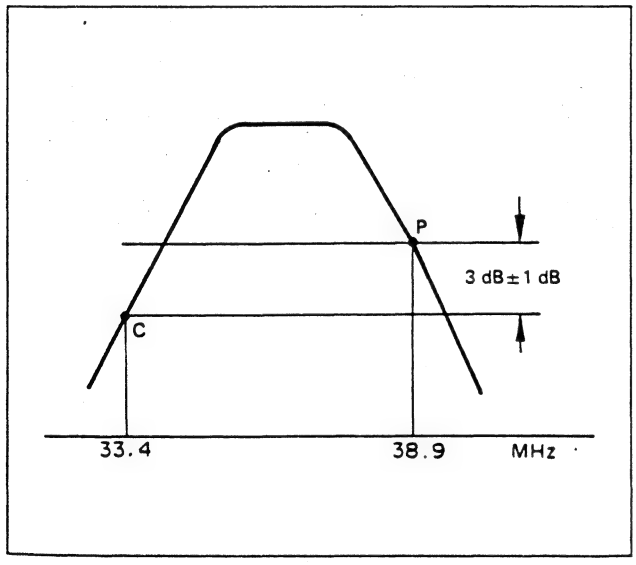


Fig. 18 IFT

3. Video Output Level Adjustment: T802

1) Connecting test equipment.

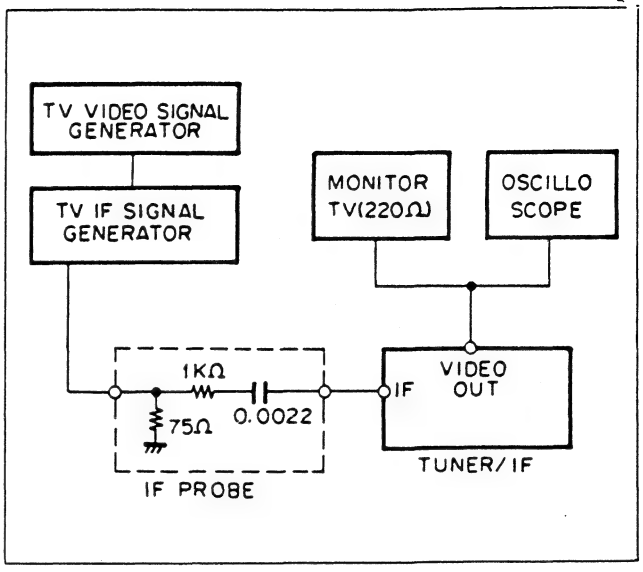


Fig. 19

2) Set the unit to the E-E mode.
3) Input the colour bar signal with a modulation of 87.5%.
4) Adjust T802 so that the p-p value is 1.0 ± 0.1 Vp-p from the sync top of the waveform on the oscilloscope.
5) Check that the monitor TV picture is normal.

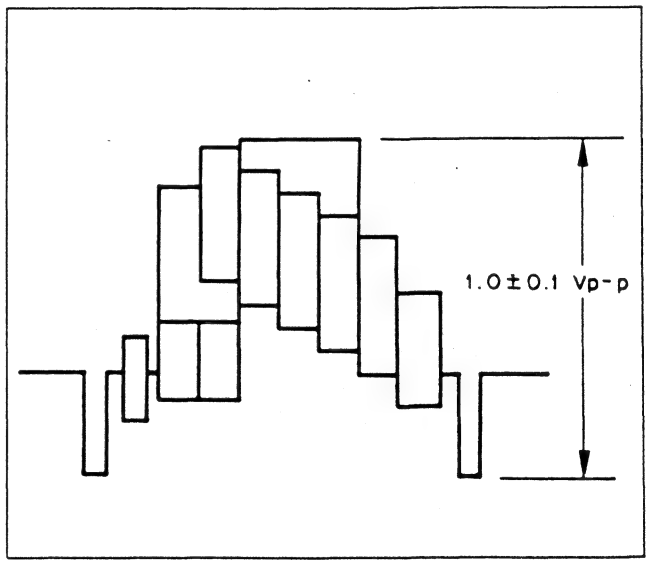


Fig. 20 Video Output Level

4. AFC Adjustment: T803

1) Connecting test equipment.

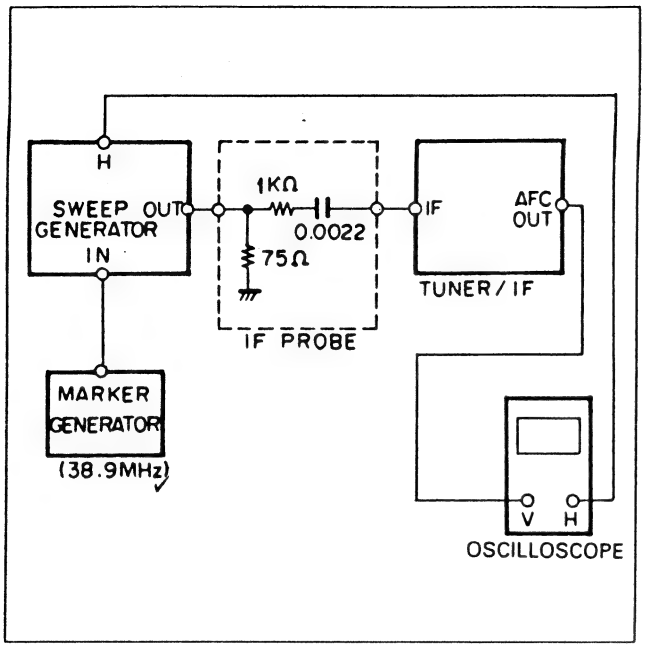


Fig. 21

2) Set the unit to the E-E mode.
3) Adjust T803 to obtain the "S" curve waveform as shown in the diagram below.

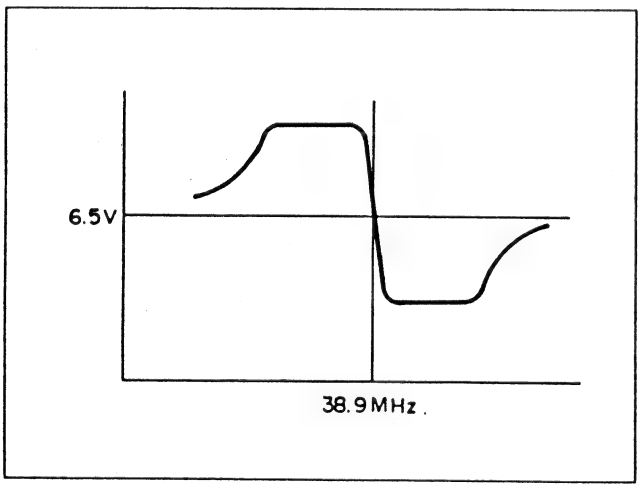


Fig. 22 AFC

5. Audio Output Level Adjustment: T804, VR752

1) Connecting test equipment.

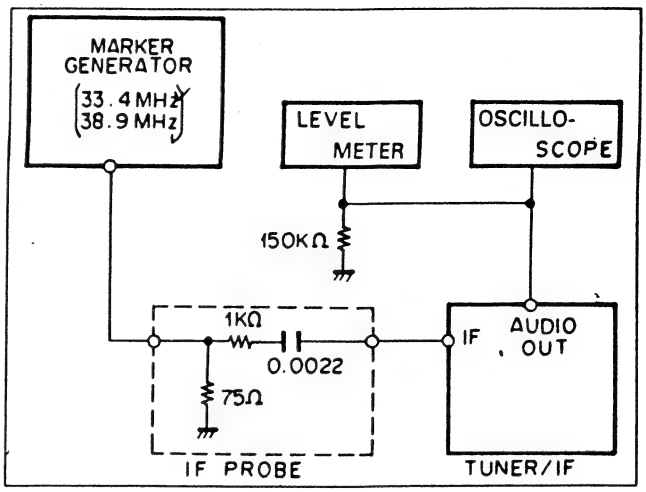


Fig. 23

2) Set the unit to the E-E mode.
3) Adjust T804 to minimiz distortion (less than 1.0%).
4) FM modulate (400 Hz/15 kHz div.) the generator signal (33.4 MHz), and adjust VR752 so that the audio output level is 116 mV – 163 mV.

6. AGC Adjustment: VR801

1) Connecting test equipment.

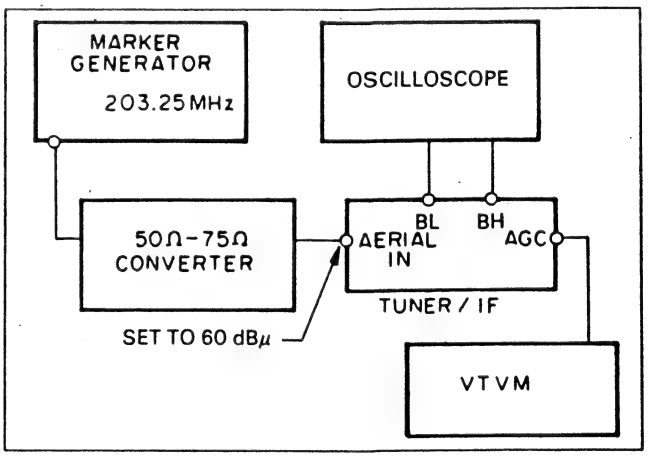


Fig. 24

2) Set the unit to the E-E mode.
3) Turn on the AFC switch.
4) Tune the tuner unit to CH-9.
5) Adjust VR801 so that the reading of the VTVM is 6.0 ± 0.4V.

5. TUNER/IF CIRCUIT ADJUSTMENT (Type 4492 model)

Perform adjustment after removing the top cover.

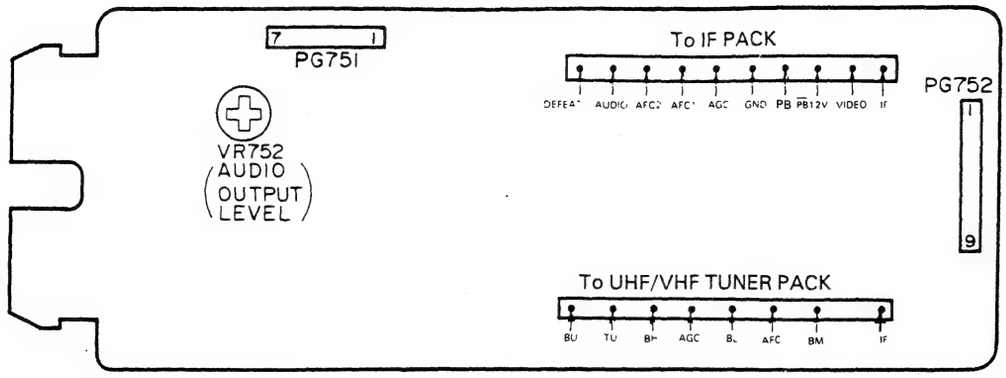


Fig. 25 Tuner/IF P.C. Board (Parts Side)

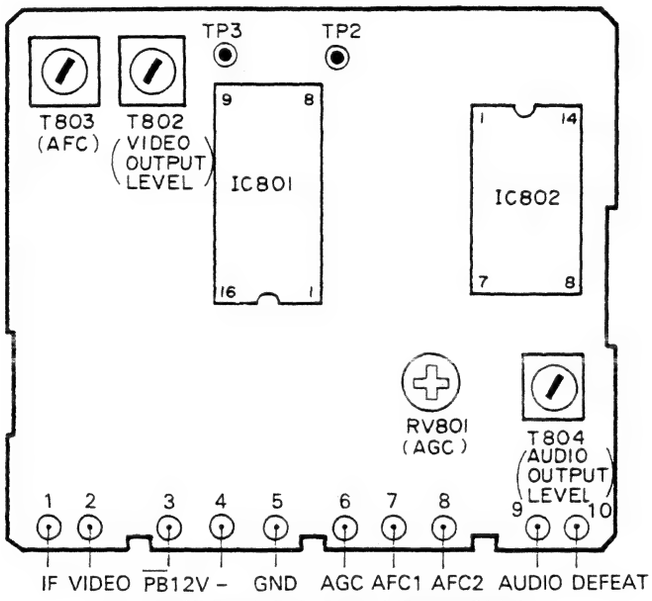


Fig. 26 IF Pack P.C. Board (Parts Side)

1. IFT Adjustment

Connecting test equipment

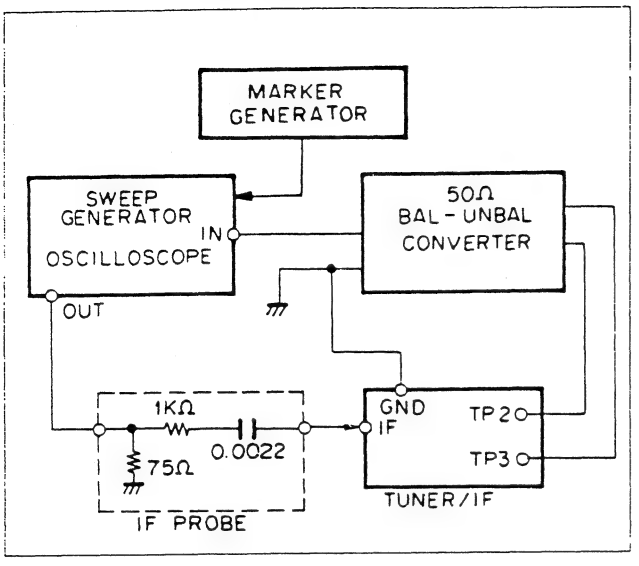


Fig. 27

VTR condition

E-E mode

Adjustment point

IFT (Tuner pack board)

Adjustment procedure

1) Adjust the generator output so that the output waveform does not deviate.
2) Adjust the IFT on the tuner pack board so that the waveform shown in the diagram below is obtained.

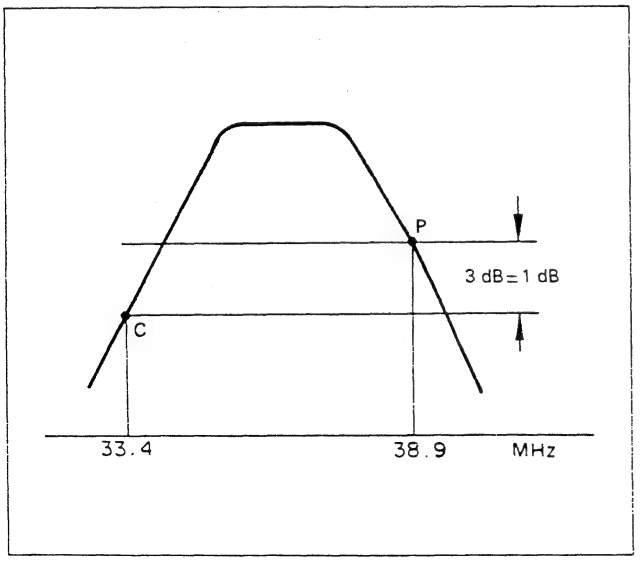


Fig. 28 IFT

2. Video Output Level Adjustment

Connecting test equipment

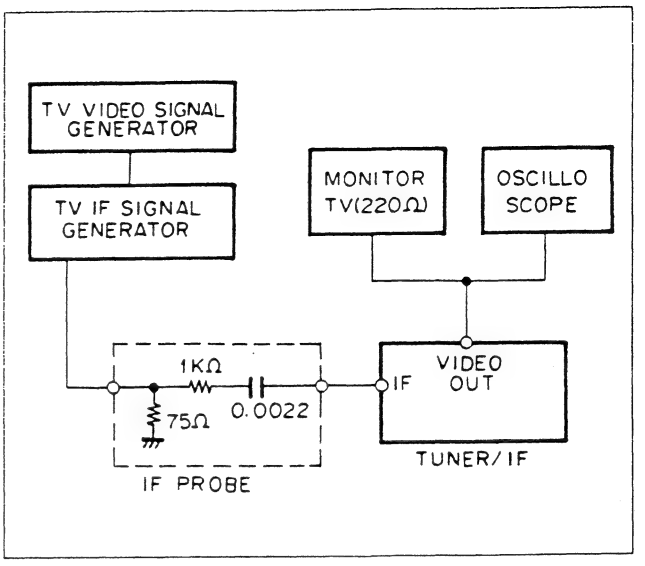


Fig. 29

VTR condition

E-E mode

Adjustment points

T802

Adjustment procedure

1) Input the colour bar signal with a modulation of 87.5%.
2) Adjust VR751 so that the p-p value is 1.0 ± 0.1 Vp-p from the sync tip of the waveform on the oscilloscope.

Check items

1) Check that the monitor TV picture is normal.

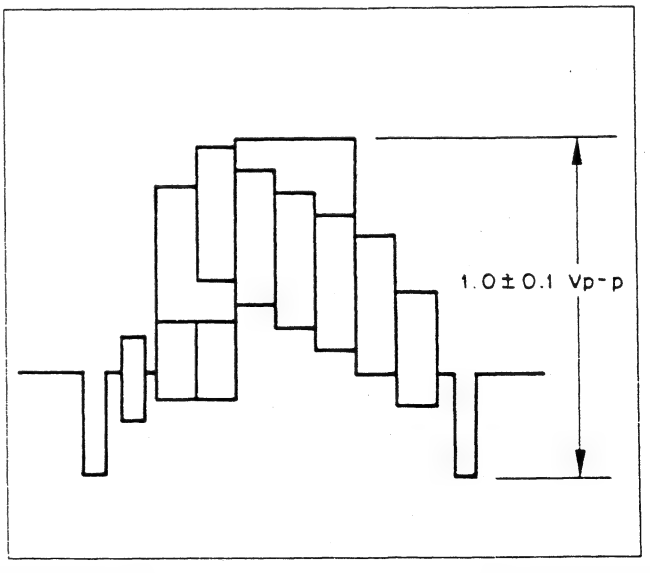


Fig. 30 Video Output Level

3. AFC Adjustment

Connecting test equipment

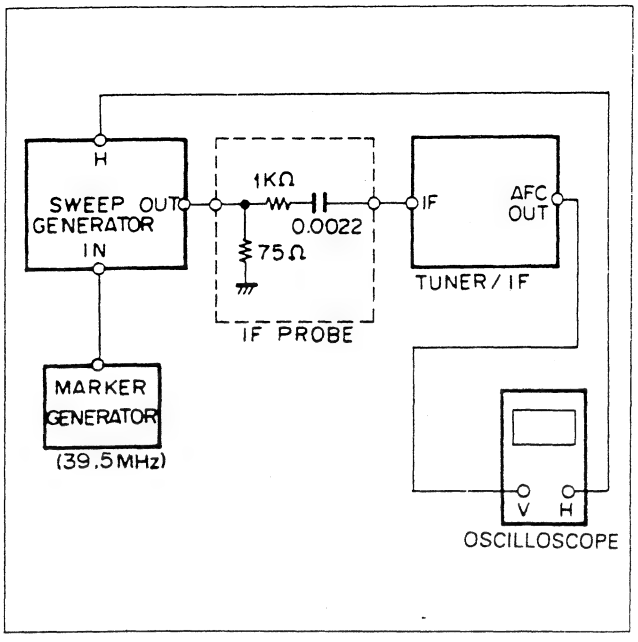


Fig. 31

VTR condition
E-E mode
Adjustment point
T803
Adjustment procedure
1) Adjust T803 to obtain the "S" curve waveform as shown in the diagram below.

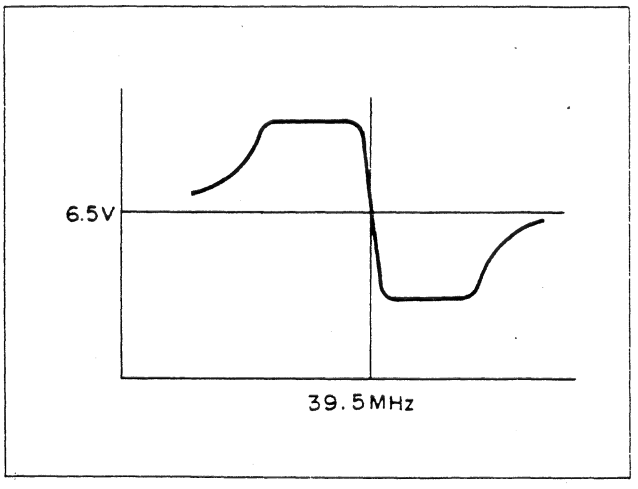


Fig. 32 AFC

4. Audio Output Level Adjustment

Connecting test equipment

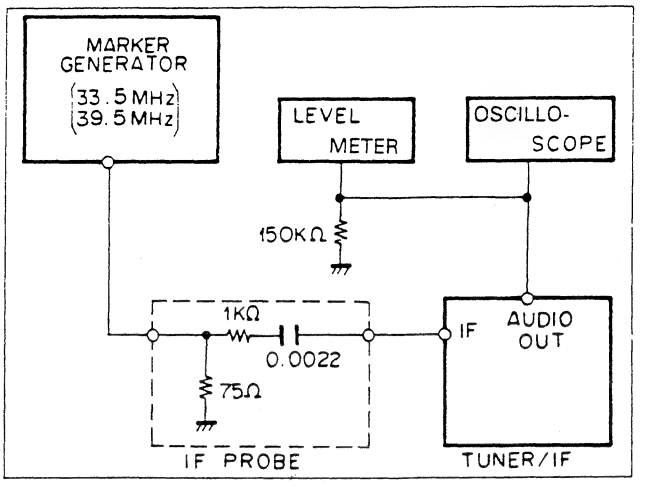


Fig. 33

VTR condition
E-E mode
Adjustment points
T804, VR752
Adjustment procedure
1) Adjust T804 to minimize distortion (less than 1.0%)
2) FM modulate (400 Hz/15 kHz div.) the generator signal (33.5 MHz), and adjust VR752 so that the audio output level is 116 mV – 163 mV.

5. AGC Adjustment

Connecting test equipment

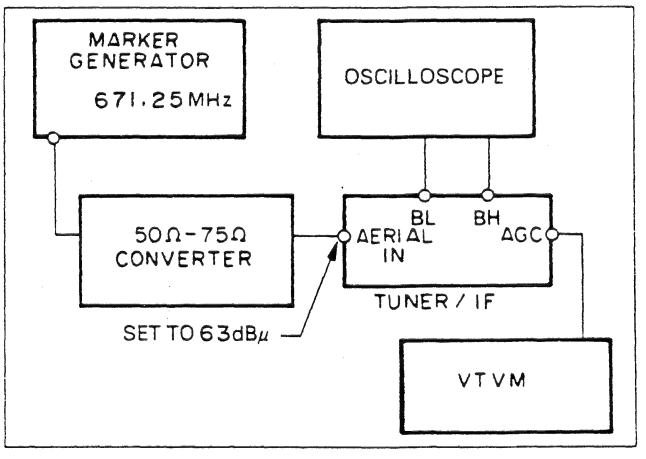


Fig. 34

VTR condition
E-E mode (AFC ON)
Adjustment point
VR801
Adjustment procedure
1) Tune the tuner unit to CH-46
2) Adjust VR801 so that the reading of the VTVM is 6.0 ± 0.4V.

6. TUNER/IF CIRCUIT ADJUSTMENT (Type 4493 model)

Perform adjustment after removing the top cover.

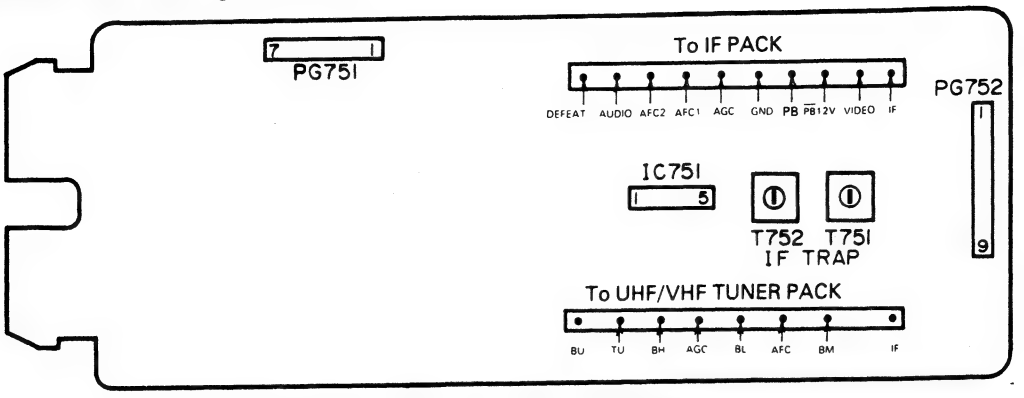


Fig. 18 Tuner/IF P.C. Board (Parts Side)

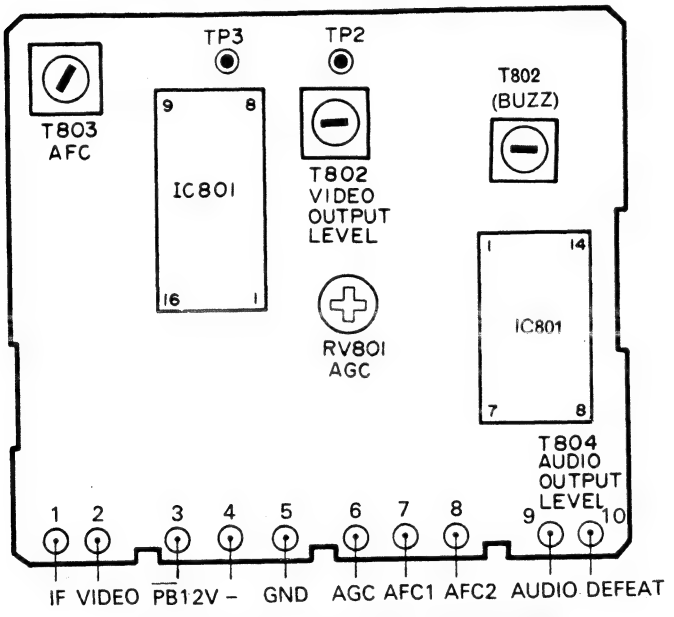


Fig. 19 IF Pack P.C. Board (Parts Side)

1. IF Trap Adjustment: T752

Connecting test equipment

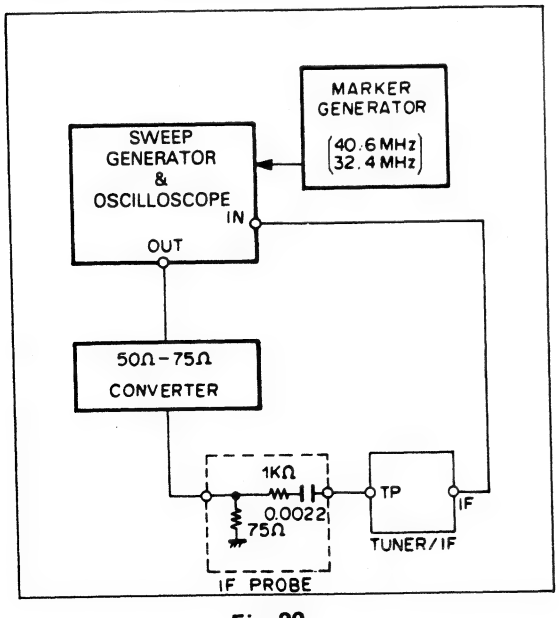


Fig. 20

VTR condition

E-E mode

Adjustment procedure

For trap adjustment, turn to adjust T751 and T752 on the tuner/IF board to obtain to obtain 32.4 ± 0.05 MHz and 40.6 ± 0.05 MHz respectively.

2. Video Output Level Adjustment: T802

Connecting test equipment

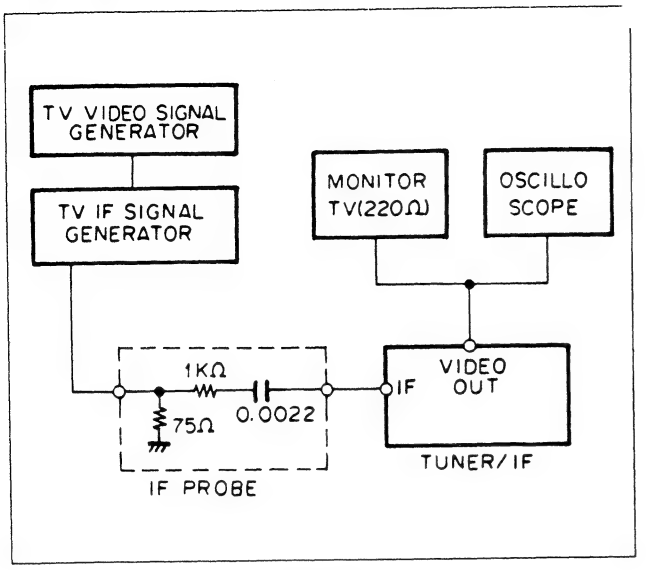


Fig. 21

VTR condition

E-E mode

Adjustment procedure

1) Input the colour bar signal with a modulation of 87.5%.
2) Adjust VR751 so that the p-p value is 1.0 ± 0.1 Vp-p from the sync tip of the waveform on the oscilloscope.

Check items

1) Check that the monitor TV picture is normal.

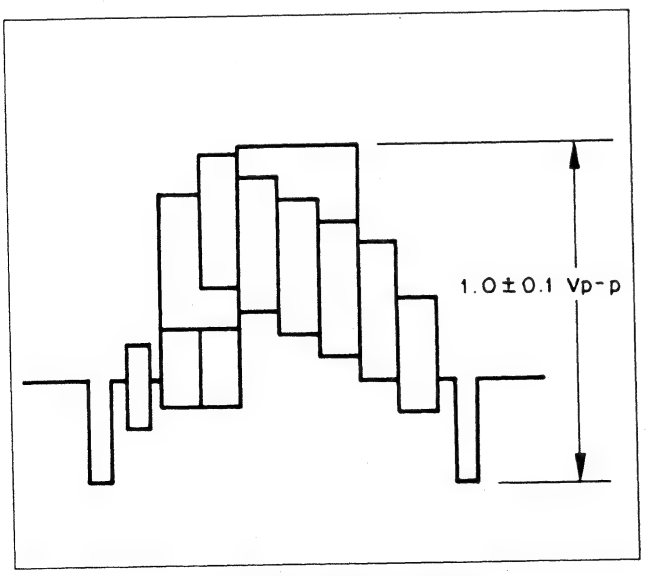


Fig. 22 Video Output Level

3. Buzz Adjustment: T801

Connecting test equipment

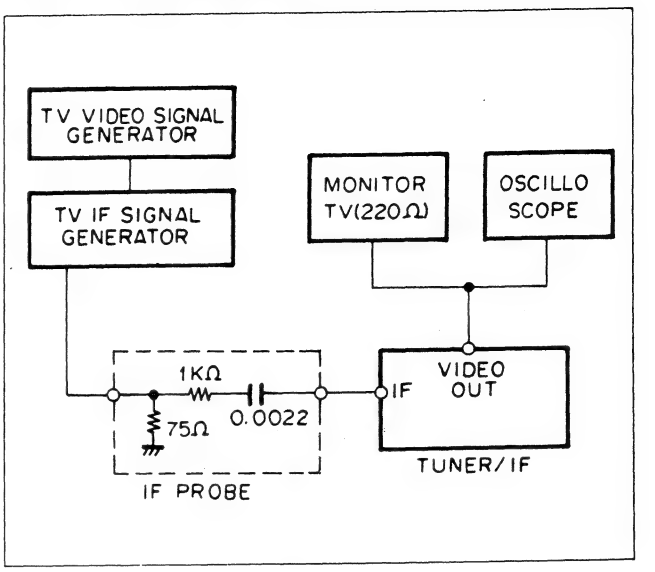


Fig. 23

[INPUT SIGNAL]

VIDEO SIGNAL: COLOUR BAR → 87.5% modulation
OUTPUT 80 dBμ
AUDIO SIGNAL (33.4 MHz): FM MODULATION; 400 Hz, 30 kHz Dev.), OUTPUT → 67 dBμ

VTR condition

E-E mode

Adjustment procedure

1) Check that the specified video and audio outputs are obtained, then turn off the audio modulation.
2) Raise the audio vertical sensitivity of the oscilloscope.
3) Adjust T801 to minimize the buzz level.

4. AFC Adjustment: T803
Connecting test equipment

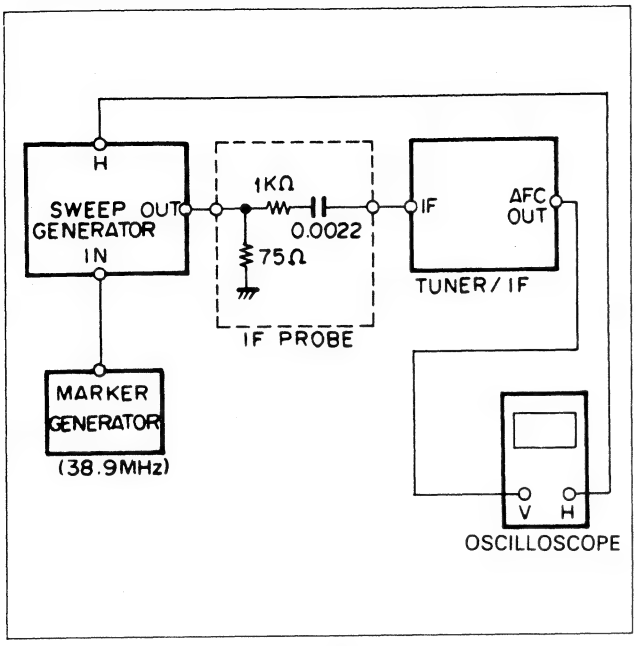


Fig. 24

VTR condition
E-E mode

Adjustment procedure
1) Adjust T803 to obtain the "S" curve waveform as shown int he diagram below.

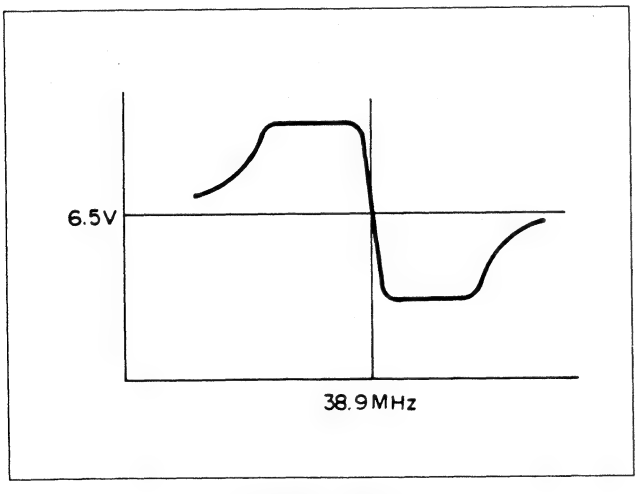


Fig. 25 AFC

5. AGC Adjustment: RV801
Connecting test equipment

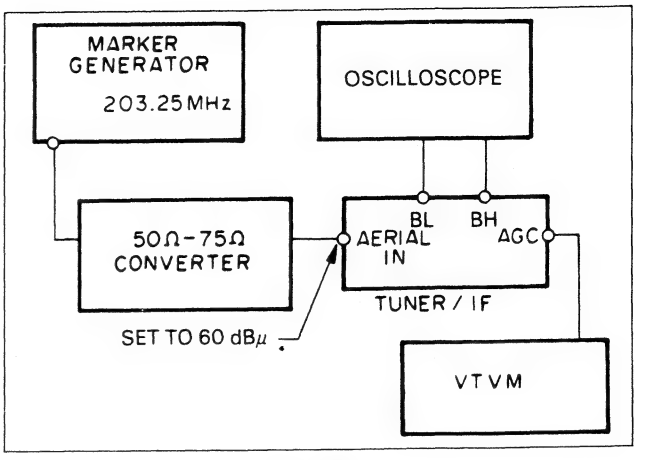


Fig. 26

VTR condition
E-E mode (AFC ON)

Adjustment procedure
1) Tune the tuner unit to CH-9.
2) Adjust RV801 so that the reading of the VTVM is 6.0 ± 0.4V.

MECHANISM ADJUSTMENT

1. MECHANISM STATE SWITCH ADJUSTMENT

This mechanism state switch is positioned near the loading gear at the bottom of the chassis, and detects the loading condition of the mechanism and controls the loading motor. If this switch is not installed correctly, loading is not done and the mechanism does not operate normally.

1) Turn the worm pulley counterclockwise just before the resistance increases.
2) Loosen the mechanism state switch fixing screw and slide the switch.
3) Tighten the screw at the point where the groove showing the stop mode and the triangular hole of the slide knob match.
   (Adjust while viewing from the right above.)

Operation check

Load a blank tape and check that loading and unloading are done correctly in all the modes. When faulty operation occurs, readjust the mechanism state switch installation position.

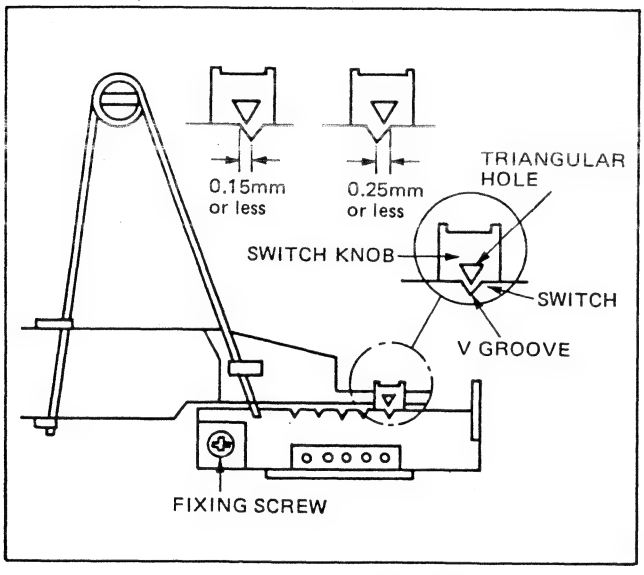


Fig. 1 Mechanism State Switch

2. TAPE TRANSPORT SYSTEM CHECK/ ADJUSTMENT

The tape transport system is the path from the supply reel disk to the take-up reel disk via the video head. The transport system parts, especially the parts which directly come into contact with the tape, should be kept clean without scratche, dust and oil, etc. on contact surfaces.

The tape transport system is adjusted when the unit is shipped from the factory, so when the transport system parts are replaced, the tape transport becomes stable by adjusting only the replaced parts.

Do not loosen the fixing screws of the parts shown below. When it is required to replace parts, be sure to install the new ones in the original positions.

1) Catcher/cylinder base

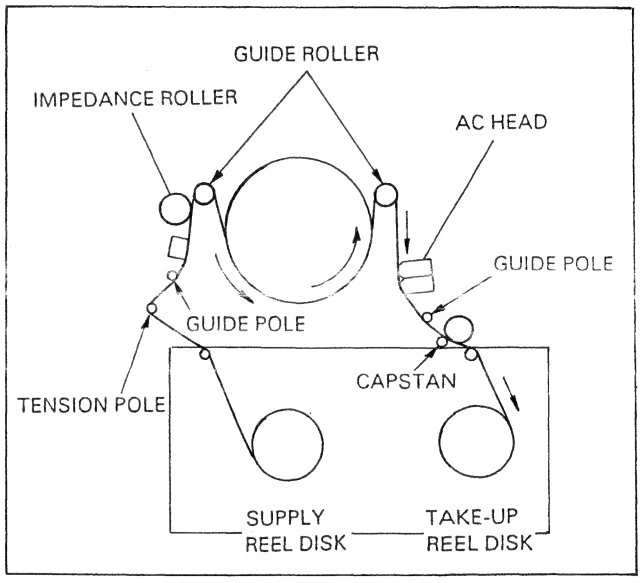


Fig. 2 Tape Transport System

1. Reel disk height adjustment

1) Remove the top cover and shield cover place the master plane on the cassette holder and lower the holder.
2) Place a reel disk height jig on the master plane and apply it to the reel disk.
3) Check that the top of the reel disk is positioned between sections A and B of the reel disk height jig.
4) When the top of the reel disk does not enter between sections A and B, adjust the number of spacers (2 types: 0.25 mm or 0.5 mm thick) at the bottom of the reel disk.

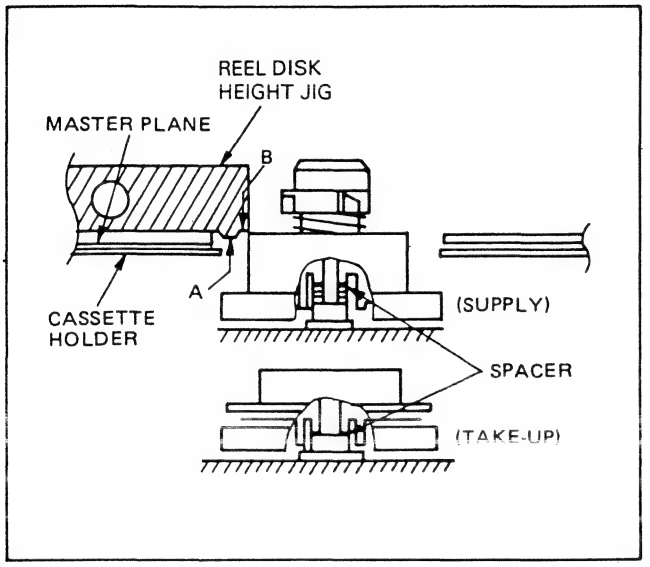


Fig. 3 Reel Disk

2. Tension pole position and tension adjustments

Adjust the tension pole position and tension at the same time, and check the tension pole position and tension. Perform the adjustments with the top cover and shield cover removed.

Position adjustment

1) Cover the light receiving port of the supply end sensor using paper, etc.
2) Press the play button without loading a cassette and set the VTR to the loading mode.
   (Refer to "How to set the VTR in the loading mode without loading a cassette".)
3) Loosen the tension band bracket fixing screw and insert the tip of a flat screwdriver into the groove between the bracket and the chassis.
4) Slide the tension band bracket using the screwdriver, and set the gap between the tension pole and chassis to 1 ~ 2 mm.
5) Tighten the bracket fixing screw.
6) Set to the loading mode again without a cassette after adjustment and check the tension pole position.

Tension adjustment

1) Load a tension cassette and play it back mode.
2) Adjust so that the reading of the tension cassette is 30 ~ 40g·cm.
3) When the reading of the tension cassette is higher than the reference value, move the spring hooking position in direction a, and when it is lower, move in direction b, to set the value as specified.
4) When the tension is changed greatly (to 6g·cm or more), check the tension pole position again. When it is incorrect, readjust the tension pole position and tension.
5) Remove the paper covering the sensor after adjustment.

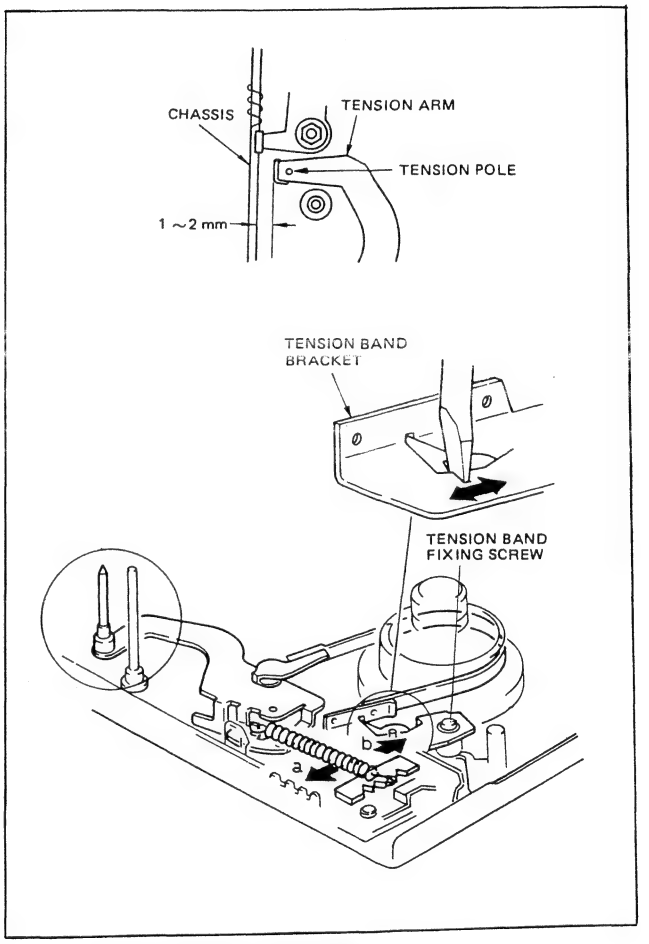


Fig. 4 Tension Pole/Tension Band

3. Guide pole height adjustment (Supply)

Guide pole height adjustment: Perform rough adjustment using the master plane and reel height adjusting jig first, and then run a blank tape to adjust the height precisely.

1) Remove the top panel and cassette holder.
2) Mount the master plane and place the reel height adjusting jig on the master plane .
   Then, roughly adjust the guide pole height adjusting nut so that the gap between the flange of the guide pole and the reel height adjusting jig is within 0 ~ 0.2 mm when side C of the jig is applied to the guide pole.
3) Install the cassette holder, load a blank tape and play it back. Check that the tape does not ride over the flange of the guide pole.
4) Tighten the adjusting nut and apply locking paint after adjustment is completed.

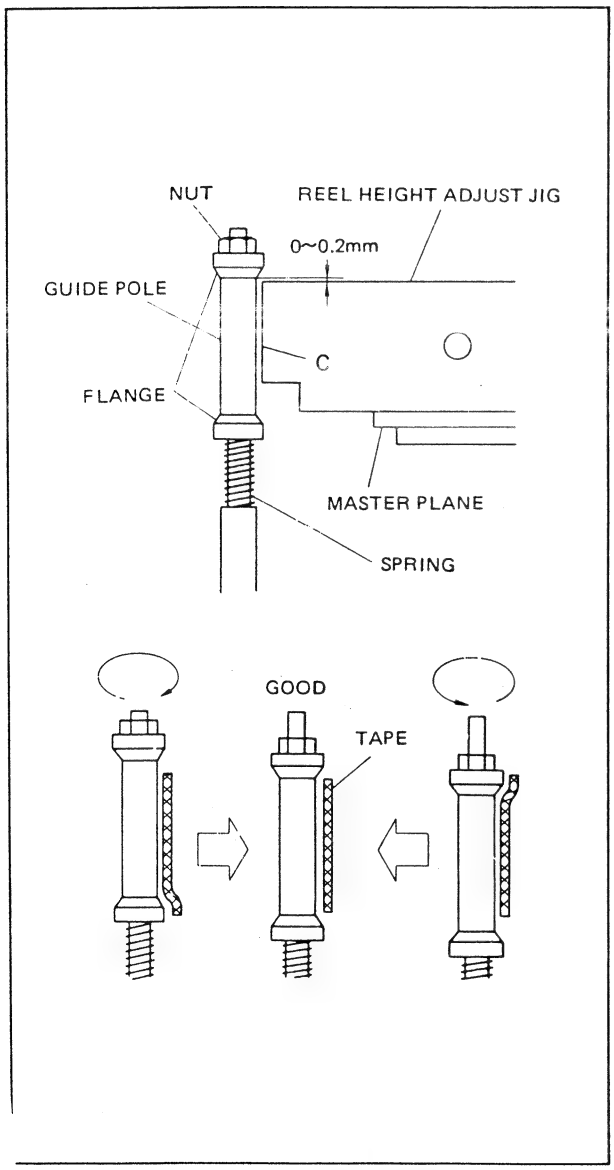


Fig. 5 Guide Pole Height

4. Guide roller height Adjustment

1) Remove the top cover and shield cover, place the master plane on the cassette holder and lower the holder. Place the reel disk height jig on the master plane and apply it to the guide roller.
2) Tighten the guide roller fixing screw at the position where the upper flange of the guide roller and the top of reel disk height jig match.
3) Run the tape and check that it does not curl or ride over and then perform electrical adjustment.
4) Connect the oscilloscope to TP202 or PG208-1 (FM output) on the Y/Chroma board.
5) Play back the color bar test tape and set the tracking control to the click position.
6) Check that the FM waveform is flat.
7) Then check that the FM drop of the envelope at two positions is equal when the tracking control is turned to the left and right.
8) When it cannot be confirmed, loosen the guide roller fixing screw and turn the guide roller slightly to the left and right so that the envelope is flat.
9) Tighten the fixing screw.

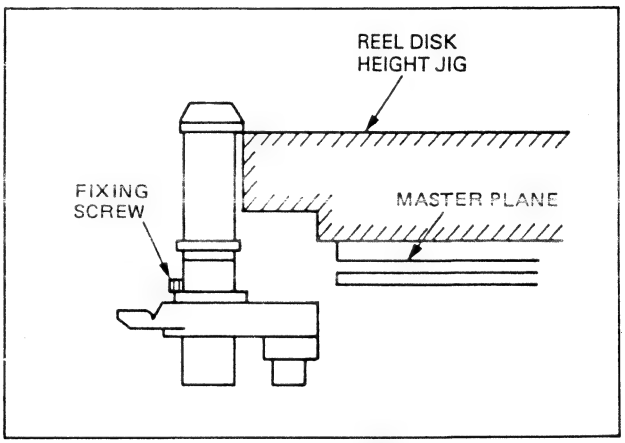


Fig. 6 Guide Roller

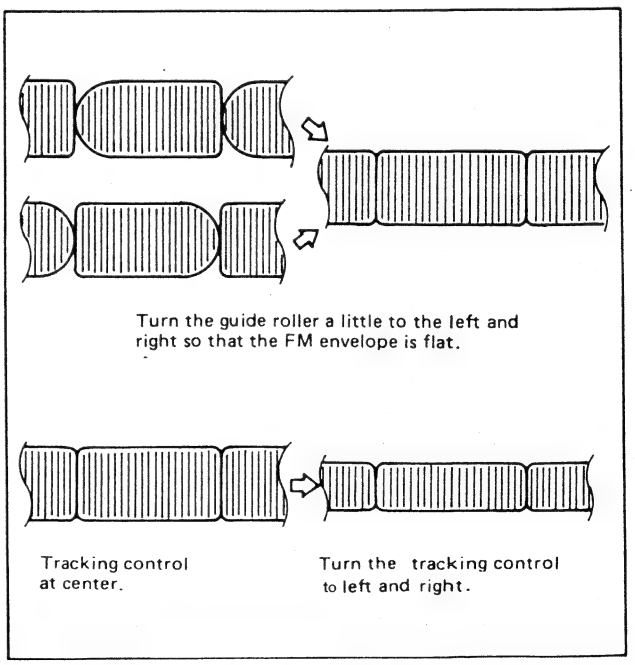


Fig. 7 FM Output

5. A/C head adjustment

Adjust the height, tilt and azimuth for the A/C head, then adjust the X value. Repeatedly adjust the former 3 items and determine the A/C head fixing position and then adjust the X value. The details of the adjustment below show the adjustment procedure when the A/C head is replaced.

Be sure to adjust precisely after performing coarse adjustment.

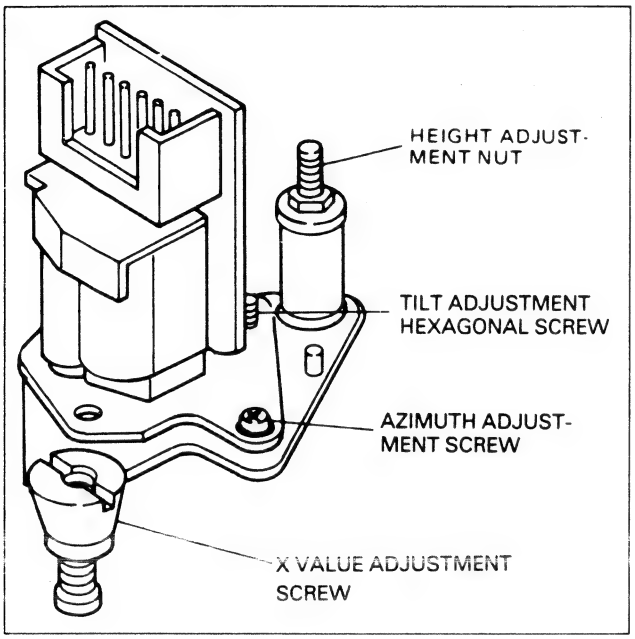


Fig. 8 A/C Head

Coarse adjustment

1) Tighten the A/C head fixing screw through the bottom of head base (2) via the spring so that the tip of the screw protrudes approx. 3 ~ 4 mm above head base (1). (Refer to Fig. 9)
2) Adjust the tilt adjusting hexagonal screw and azimuth adjusting screw so that head base (1) and head base (2) are parallel.
3) Place the master plane on the cassette holder and lower the holder.
4) Place the reel disk height jig on the master plane and bring it near the A/C head, then adjust the height adjusting nut so that the gap between the reel disk height jig and the shield case of the A/C head is approx. 0.5 mm. (Refer to Fig. 10)
5) Remove the adjusting jigs, load a blank tape and set the VTR to the play mode. Check that conspicuous curling or riding over of the tape does not occur around the A/C head. When conspicuous curling or riding over, etc. occurs, readjust the tilt adjusting hexagonal screw, azimuth adjusting screw and height adjusting screw. The height of the A/C head should be approx. 0.1 ~ 0.15 mm above the bottom of the control head core. (Refer to Fig. 11)

Precise adjustment

1) Connect the L-ch audio output and CH-1 of the oscilloscope, and connect the R-ch audio output and CH-2.
2) Adjust playback level controls RT401L, RT401R described in the audio circuit adjustment for the maximum outputs.
3) Playback the audio 7kHz signal on the alignment tape. Turn the adjustment screws for the tilt, azimuth and the AC head height alternately so the audio outputs from the both channels shown in Fig. 11 are maximum and the envelopes are flat and stable. When the audio output levels from the two channels differ, adjust the levels to their average value.
4) Confirm that the phases of both channels match. When they differ, readjust the azimuth adjustment screw.
5) Perform the playback level adjustment described in the audio circuit adjustment..

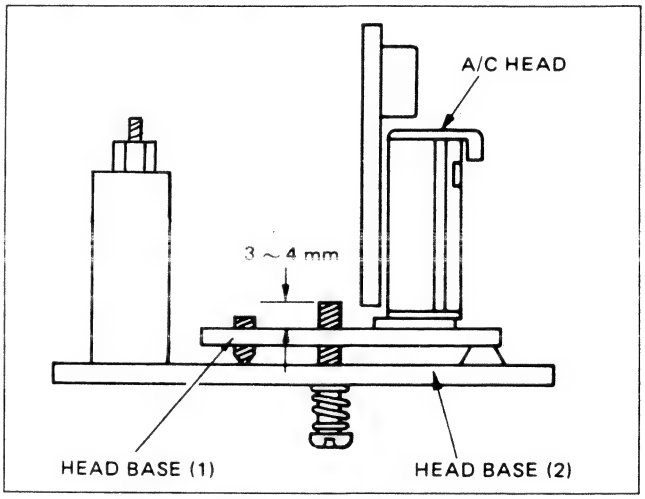


Fig. 9 Azimuth/Tilt Adjustments

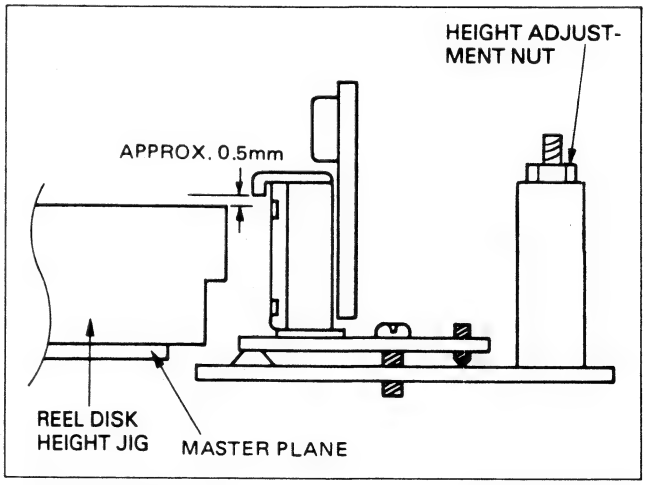


Fig. 10 Height Adjustment

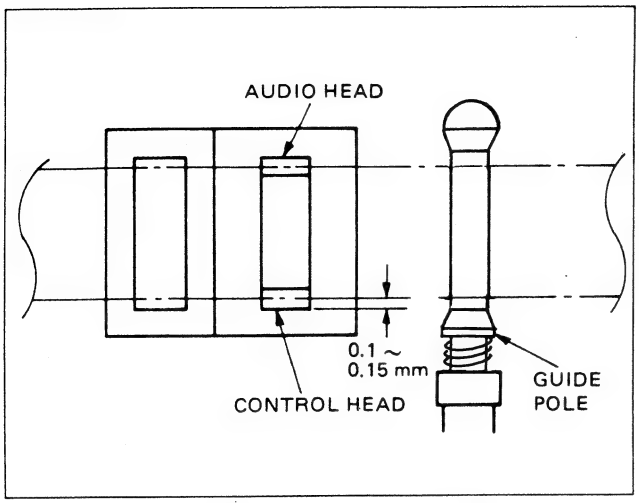


Fig. 11 Height Adjustment

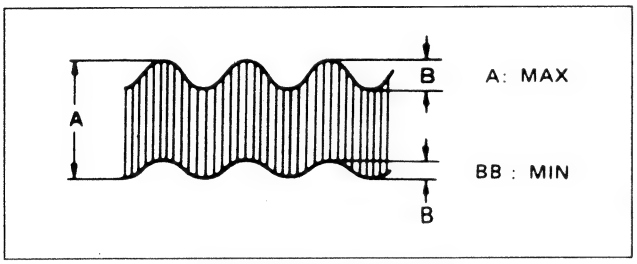


Fig. 12 Audio Outut

X value adjustment

* Be sure to perform "Tracking Preset Adjustment" before adjusting the X value.

6) Connect the oscilloscope to the FM output pin (TP-4503) of the FM audio P.C. Board.
7) Load the VTR with the Hi-Fi audio alignment tape and playback it.
8) Set the tracking control to its center click position and adjust the X value adjusting screw so that the peak-to-peak value of the FM envelope is maximum. Fig. 13 shows the variation characteristics of the peak-to-peak value of the FM envelope with respect to the turning of the tracking control when the X value is optimized using an alignment tape.
9) Check item 10) again.
10) Lock the tilt adjusting hexagonal screw, X value adjusting screw, azimuth adjusting screw and height adjusting nut with paint after adjustment is complete.
11) Perform the playback level adjustment and bias level adjustment described in the audio circuit adjustment.
12) Adjust the guide roller height after this adjustment is complete.

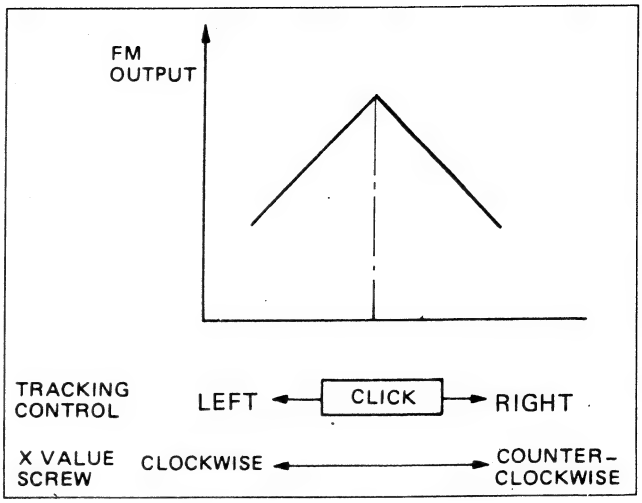


Fig. 13 Tracking Characteristics

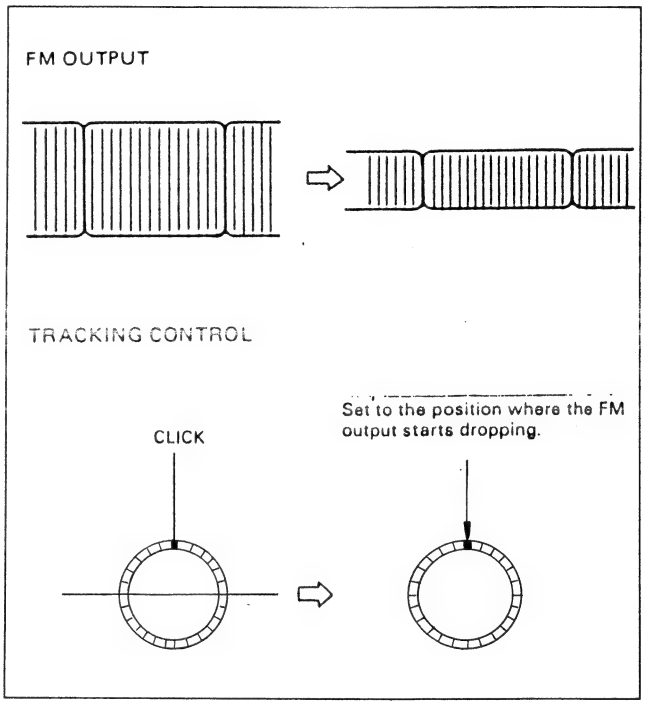


Fig. 14 X Value

6. Adjustments after replacing the cylinder (video head)

When the cylinder is replaced, the relative height with the guide roller and the X value, etc. drift, so it is required to adjust the tape transport system and servo system.

Note: The drift of the relative height and X value are so little when the cylinder is replaced normally, so they can be corrected by electrical adjustments.

1) Check that curling and creasing are not present around the guide roller.
   When they are present, adjust the guide roller height.
2) Perform the tracking preset adjustment (servo circuit).
3) Adjust the X value (See "A/C head adjustment".).
4) Check the flatness and level change of the FM output. The method to check is described later.
5) Adjust the servo circuit and Y/Chroma circuit.
   - ○ Head switching point adjustment (Servo circuit)
   - ○ Record Y/Chroma level adjustments (Y/Chroma circuit)

Checking the flatness and fluctuations of the FM output

1) Set the tracking control to the click position.
2) Fine adjust the voltage level range of the oscilloscope to set the FM output to 4 graduations.
3) Turn the tracking control to set the max. amplitude of the FM output to 3 graduations.
4) Check that the minimum amplitude is more than 2 graduations at this time.
5) Check that the level fluctuation is less than 13% at max. and min.

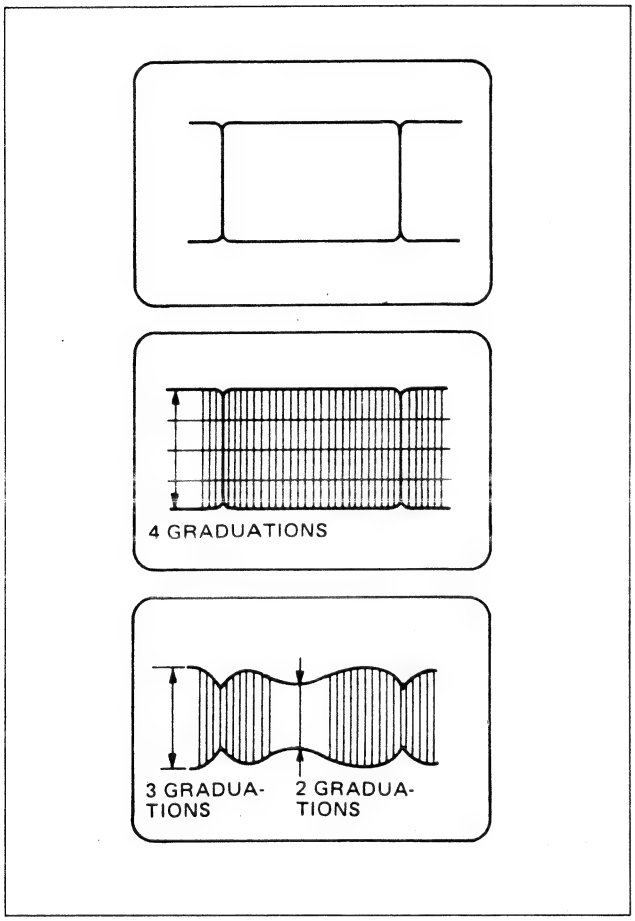


Fig. 15 FM Envelope Flatness

3. TENSION AND TORQUE CHECKS

Checking the tension, torque and the compression strength at the movable section of the tape take-up section is required to smooth the tape transport and to satisfy the fundamental functions of the VTR. When the tape transport is not smooth or the tape speed is abnormal, perform this checking to find out the faulty section, replace the faulty parts and check again.

Note 1: The value measured while sliding the torque gauge at the speed of 0.8 rps using the torque gauge and torque gauge adapter. The main brake torque, however, shows the value measured while turning the take-up reel counterclockwise and the supply reel clockwise by hand at the speed of 0.8 rps.

Note 2: The value measured while drawing the take-up reel disk counterclockwise and the supply reel disk clockwise at the speed of 50 mm/sec using the dummy reel and fun type tension gauge.

Item	VTR operation mode	Measured reel	Measurement value	Remarks
Main brake torque	Stop	Supply & take-up reels	170g·cm or more	Note 1
Unloading torque	Unloading	Supply reel	90～190g·cm	Note 1
Fast forward torque	Fast forward	Take-up reel	400g·cm or more	Note 1
Rewind torque	Rewind	Supply reel	400g·cm or more	Note 1
Take-up torque	Play	Take-up reel	90～180g·cm	Note 1
Back tension torque	Fast forward	Supply reel	4～15g·cm	Note 2
	Rewind	Take-up reel		

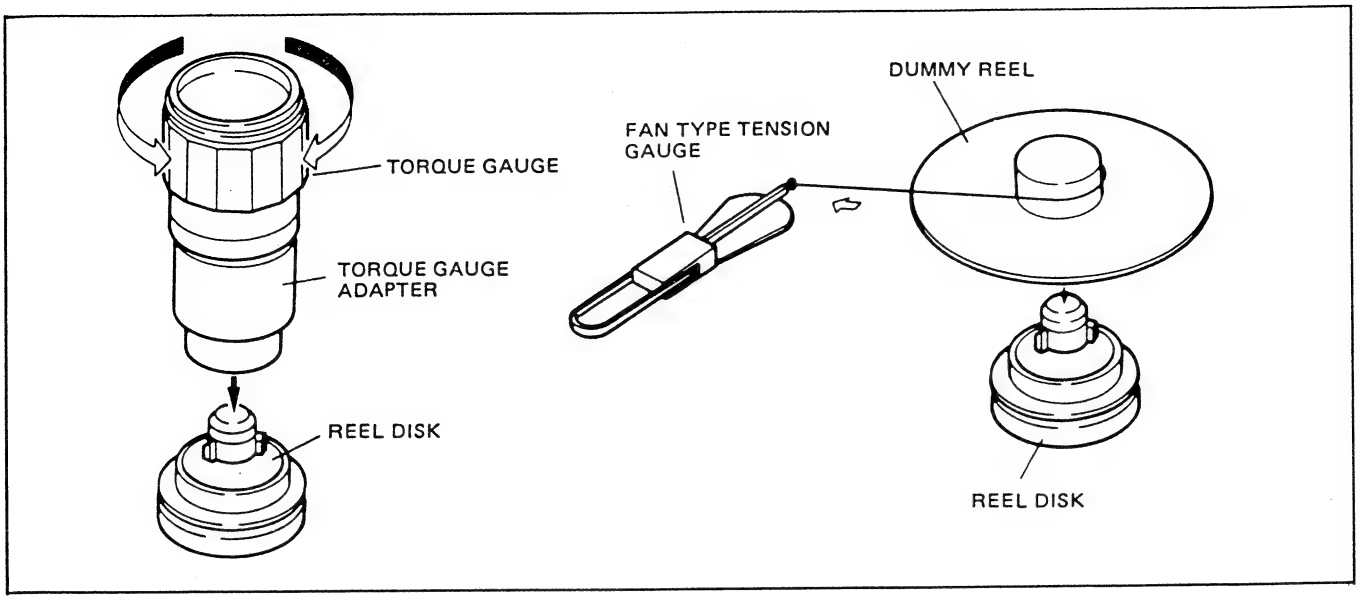


Fig. 16 Tension/Torque Measurement

4. HOW TO PLACE THE VTR IN THE LOADING MODE WITHOUT LOADING A CASSETTE

Method 1

1) Remove the side panel/L.R.
2) Remove the top cover.
3) Apply paper, etc. over the light receiving ports (A) of the end sensors on both sides of the cassette holder.
4) Lower the cassette holder while pressing tabs (B) on both sides of the cassette holder. All operation modes can be input to the VTR in this condition. The rewind operation, however, can be doen only for a few seconds because the take-up reel disk is in the stop mode and reel pulse detection is not possible.
   Be careful in that when the covering paper, etc. is too thin, the end sensor detects infrared rays or external light, and it may not be possible to input each operation mode.

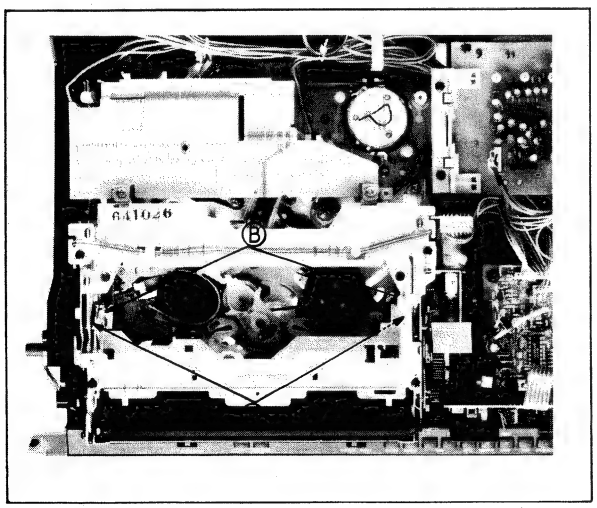


Fig. 17 Cassette Loading Mechanism

Method 2

1) Remove the side panel/L.R.
2) Remove the top cover.
3) Unplug the power cord of the VTR from the AC outlet.
4) Disconnect the connector (PG04) from the cassette loading motor circuit board.
5) Connect a jumper between pins 2 and 5 of connector (PG04).
6) Plug the power cord of the VTR into the AC outlet.
7) Turn "on" the power siwtch of the VTR.
8) The above procedure enables to operate the VTR without loading a cassette tape.

Note 1 : Operate the play and record buttons simultaneously while pressing the safety tab switch lever in order to place the VTR in the record mode.

Note 2 : After the above operations are completed, disconnect the jumper and connect the connector (PG04) to the cassette loading motor circuit baord, then unplug the power cord of at the VTR from the AC outlet to reset the system control microprocessor.

INSULATION TEST

EVERY set **must** be insulation tested after having been dismantled. The test is carried out when the set is fully assembled and ready to be delivered.

Make the insulation tetst as follows:

Short circuit the two pins of the mains plug. There are connected to one of the terminals and the insulation tester.

Connect the other terminal of the insulation tester to chassis of one of the two antenna sockets.

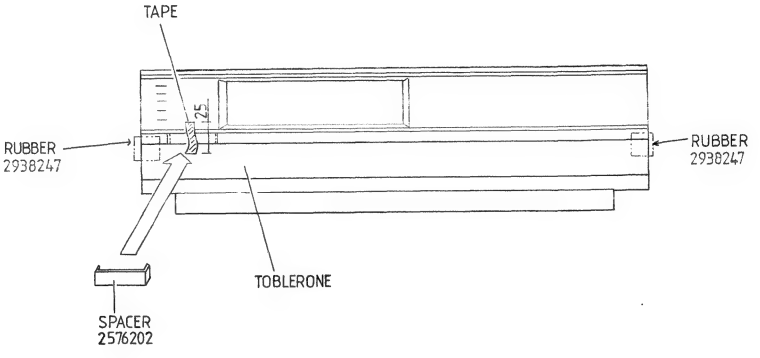
OBS!
To avoid damaging the BEOCORD it is important that both terminals from the insulation tester have very good contact.

Now the voltage control of the insulation tester is turned slowly until a voltage of 1,5-2 kV is obtained. Hold this voltage for 1 sec., then slowly turn down again.

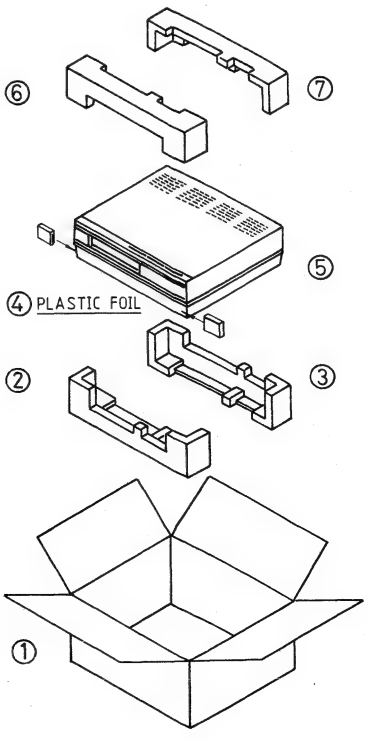
At no point during the testing procedure any flashovers are permissible.

PACKING

1	3391900	Carton Box
2-3-6-7	3397596	Cushion
4	3390248	Soft Sock



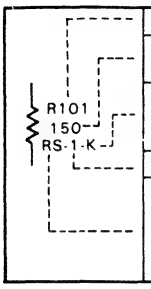
When repacking please follow these instructions ① – ② – ③ ...etc.



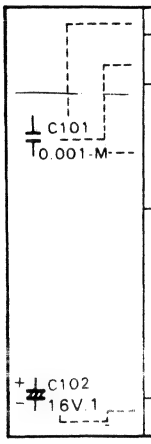
SERVICE TIPS

Note

1. Voltage measured at base of chassis with minimum volume control and no signal.
   ( ) are shown in recording condition.
2. Nomenclature of Resistors and Capacitors.



Circuit No.	
Value	No indicated Ω (Ohm) M : 1000kΩ
Tolerance	No indicated ± 5% K : ± 10% M : ± 20%
Wattage	No indicated ¼ W
Sort	No indicated Carbon film RC : Composition RW : Wire wound RS : Oxide metal film RN : Fixed metal film



Circuit No.		
Value	No indicated μF P : PF	
Tolerance	No indicated ± 10% J : ± 5% M : ± 20% Z : + 80%, - 20% D : ± 0.5pF C : ± 0.25pF	
Sort	⊣⊢	Ceramic
	+⊣⊢	Electrolitic
	M⊣⊢	Mylar
	P⊣⊢	Polyester
	S⊣⊢	Styrol
Voltage	No indicated 50WV	

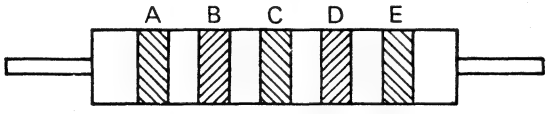
3. Be sure to make your orders of resistors and capacitors with value, voltage, tolerance and sort.
4. When replacing capacitors marked With * use specified ones stated on parts list since required temperature characteristics.

Caution on use of MOS IC △

1. The MOS IC is inserted in black foam for shipment. This foam is a conductor which short-circuits between the leads to prevent damage. Do not remove ICs from this foam during their storage. Avoid removing ICs from this foam, pacing them on plastic which is likely to be charged with static electricity or inserting them into styrol foam.
2. High voltages may be applied during soldering caused by leagages from the soldering iron, so be sure to ground the tip of the soldering iron or use a low voltage soldering iron.
3. The human body, clothes made of synthetic fibres or nylon gloves may be charged with several thousands volts of static electricity because the friction, so a workers should be grounded.
4. Be sure to ground measuring instruments such as oscilloscopes, VTVMs, etc. used for repairs.

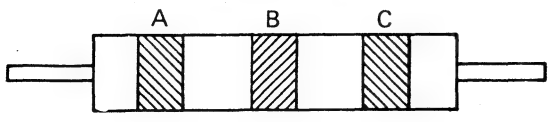
HOW TO READ CAPACITY AND INDUCTANCE OF RESISTOR SHAPE CAPACITORS AND COILS

CAPACITOR



CAPACITY: (10A+B)xC [PF]
TOLERANCE: D
RATED VOLTAGE: BODY COLOR
Pink: 25V
Green: 50V
CHARACTERISTICS: E

COIL



INDUCTANCE: (10A+B)xC [μH]

COLOR	A, B	C	D	E
Black	0	10^0	±20%	For temperature compensation
Brown	1	10^1		
Red	2	10^2		
Orange	3	10^3		
Yellow	4	10^4		
Green	5	10^5		
Blue	6			
Violet	7			
Grey	8		±30%	High dielectric constant type
White	9			For temperature compensation
Gold		10^{-1}	± 5%	
Silver		10^{-2}	±10%	High dielectric constant type

1. 12V Shift Voltage

12V shift voltage (21 pole A/V plug pin 8) can be totally inhibited by cutting diode 501 jack PCB.

2. Lift Assembly

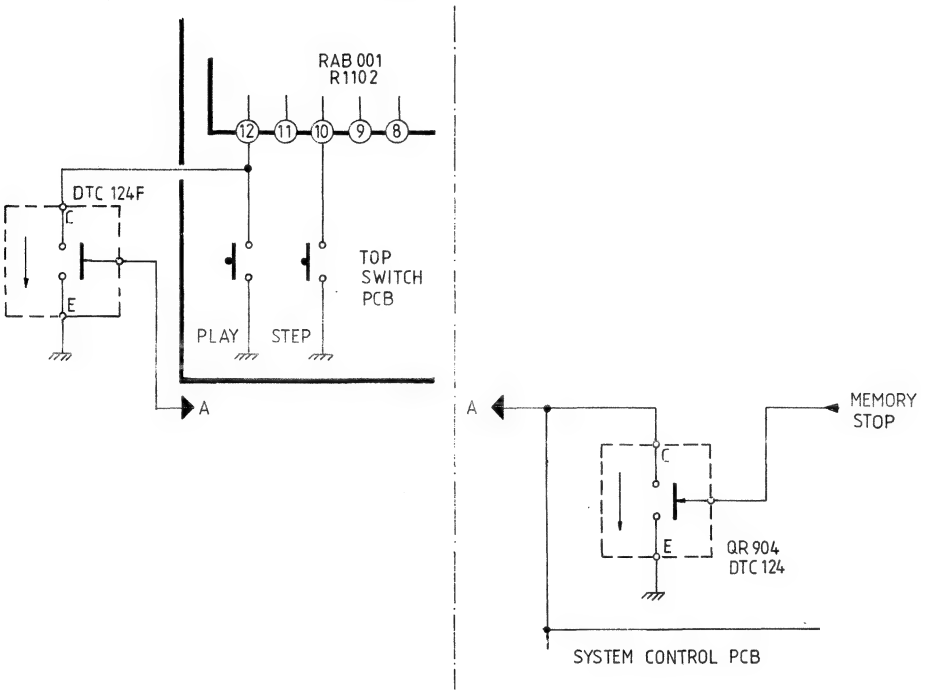
Mechanism can be operated without lift assembly when PG04 on lift assembly is disconnected and a 1 kohm resistor is connected between pin 2 and 3 on PG04 (resistor only necessary at first start after mains off).

3. Timer Function

By connecting D107 cathode to junction R119/R123 (point just below cathode on PCB) the clock speed is increased 60 times for use when testing timer function.

4. Automataic Playback

Automatic playback can be established by connecting a lead from collector of QR904 to the base of an additional transistor (DTC 124F) with collector connected to pin 12 of R1102 on top switch PCB and emitter to ground.



When reaching tape end, the set will automatically return to 0000 and go into playback mode.

5. 21 pole A/V plug

Video output level 1V ±3 dB/75Ω.
Audio output level 600 mV/1 kΩ.

6. Remote control

When connecting VCR to future products it may be necessary to delete the IR pulse extender circuit on Remote Control PCB. This is done by cutting C 1106.

7. Re-set of channels from programmes

Total re-set of all programmes can be made in the following way:

1. Swich off the VCR at the main switch on the back.
2. Place the tuning switch in the "select" mode.
3. Press the fine-tuning buttons + and – and switch on the main switch at the same time.
4. Keep the fine-tuning pressed until light appears in the clock display.
5. All channels are now re-set, and new programming of tuner can be made.

PIN SPECIFICATIONS

1-7. System Control IC (IC901) Pin Specifications

Function: Circuit/motor control in each mode, Mechanism state/trouble detection

Pin	I/O	Active Level	Abbreviation	Function
1	0	↑ ↓	CLOCK	Clock pulse necessary for communications of data at pins 2 and 3.
2	I	↓	DATA (T-S)	Communicating data bus with Timer μP.
3	0		DATA (S-T)	Communicates data while synchronizing with the clock pulse at pin 1. (Refer to Table 1-3).
4	0	Hi	MUTE	Audio/video muting control output. · During loading: Hi
5	0	Hi	M.CUT	Video output ON/OFF control output during loading.
6-15		Indicator lighting control outputs not used in this unit.		
6	0	Hi	STOP INDI	For stop mode (not used in this unit)
7	–	–	–	–
8	–	–	–	–
9	–	–	–	–
10	0	Hi	REW INDI	For rewind mode (not used in this unit) · Lights in the rewind mode. · Flashes in the reverse search mode.
11	0	Hi	F.FWD INDI	For fast forward mode (not used in this unit) · Lights in the fast forward mode. · Flashes in the forward search mode.
12	0	Hi	PAUSE INDI	For pause mode (not used).
13	0	Hi	PLAY INDI	For play mode (not used) · Lights in the play, trick play, record and audio dub modes.
14	0	Hi	REC INDI	For record mode (not used)
15	0	Hi	POWER INDI	Indicates the power switch ON state.
16-18				
16	0		A/D IN	Receives a pulse of which trailing edge varies depending on the operation command to descriminate the operation command.
17	0		V(RX) RESET	Pin 17 and pin 18 output timing pulses to the A/D converter to discriminate the operation command.
18	0		DISCHARGE	
19	I	–	A/D SW	Determines the functions of pins 16, 17 and 18, should be grounded in this unit.
20	I	–		Determines the specification of visual search function, should be connected with VVC in this unit.
21	I	Hi	C.PAUSE	Detects the camera pause or remote pause command. · When this pin becomes Hi, the unit enters the pause mode, and the pause mode cannot be released by operating the PAUSE button on the VTR not used in this unit.
22	0	–	–	Not used
23	0	Hi	REVERSE	Capstan reverse control output. · During reverse search, phase matching: Hi.
26	I	Hi	RESET	μP RAM reset pin · Initializes the μP with the Hi input
27	–	–	GND	Grounds the μP

Pin	I/O	Active Level	Abbreviation	Function
28	–	–	GND	Grounds the μP
29	–	–	OSC	Sets the μP reference oscillation frequency.
30	–	–	–	–
32	I	Hi	+B	μP power input (1OV)
33	I	Hi	SAFETY TAB	Detects record enable (safety tab) · Recording enabled with Hi input (tab: provided)
34-38		Detect cassette holder state/mechanism loading state.		
34	I	Lo	M.STATE O	Detect mechanism state. Provide the data for controlling the tape loading motor. *1: PLAY, REC, FWD SEARCH, STILL
35	I	Lo	M.STATE 1	
36	I	Lo	M.STATE 2	

	STOP	F.F/REW	REC PAUSE	PB*-1	REV SEARCH	IN TRANSITION
10	Lo	Lo	Hi	Hi	Hi	Hi
11	Hi	Lo	Lo	Lo	Hi	Hi
12	Hi	Hi	Hi	Lo	Lo	Hi

37	I	Hi	CST DOWN	Detect cassette holder state. Provide the data for controlling the cassette loading motor.
38	I	Hi	CST UP	

	UP	CASSETTE IN	IN TRANSITION		DOWN
37	Lo	Lo	Hi	Hi	Lo
38	Lo	Hi	Lo	Hi	Hi

39	–	–	–	–
42	I	Hi	DEW	Detects condensation · Unloading to stop with Hi input. · Flashes the stop indicator in Hi period. · Inhibits accepting of all the operations in Hi period.
43	I	Lo	SP	Tape speed data input (not used in this unit). · Switches the F.ADV output at pin 22 during the frame advance operation.
44	I	Hi	REW END	Detects reverse tape end using the takeup end sensor. · Unloading to stop with Hi input.
45	I	Hi	FWD END	Detects forward tape end using the supply end sensor. · Unloading to stop with Hi input during timer recording. · Auto rewind is performed with Hi input during search, play, record, fast forward.
46	I		REEL LOCK	Detects reel disk rotation. Measures the periode of the pulse generated by the Hall element at the bottom of the reel disk. · Unloads/stops the unit if the input period is more than specified.

Mode	Detection Specifications (1/2 period)
NORMAL REC/PLAY	More than 3 sec
SEARCH, DOUBLE SPEED	More than 3 sec
STILL, SLOW F. FWD, REW	More than 1,5 sec

Pin	I/O	Active Level	Abbreviation	Function
47-49		2-channel (cassette loading, tape loading), more driver control outputs.		
47	0	Hi	LM(-): MOTOR 3	Cassette loading/tape loading motor drive outputs.
48	0	Hi	LM(+): MOTOR 2	

	STOP	LOAD	UNLOAD	BRAKE
Pin 48	Lo	Hi	Lo	Hi
Pin 47	Lo	Lo	Hi	Hi

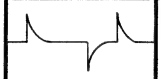
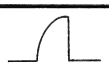
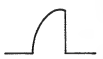
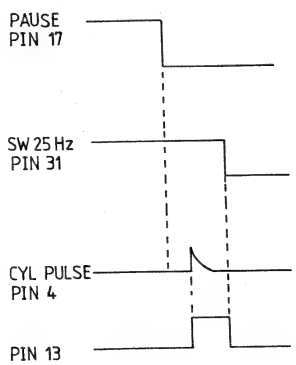
49	0	Hi	TAPE LOAD: MOTOR 1	Dual loading motor driver drive switching output. Hi: Tape loading drivere operated Lo: During the cassette loading driver operation and in the normal mode.
50	I	–	CYL LOCK	Detects abnormal cylinder rotation. · Unloads/stops the unit if the frequency of the SW30 Hz pulse is lowered below 1.5 Hz.
51	0	Hi	CAPST 3	Capstan motor control outputs.
52	0	Hi	CAPST 2	
53	0	Hi	CAPST 1	

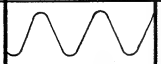
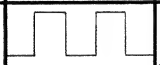
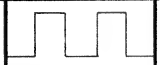
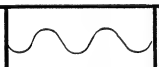
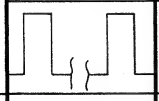
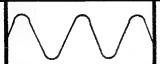
	PLAY, FWD SEARCH	REV SEARCH	SLACK REMOVAL (REW)	F.FWD START	FWD	REW START	REWIND	BRAKE
51	Hi	Lo	Lo	Hi	Hi	Lo	Lo	Hi
52	Lo	Hi	Lo	Lo	Hi	Hi	Lo	Hi
53	Lo	Lo	Hi	Hi	Lo	Hi	Hi	Hi

54	0	Hi	POWER CONTROL	Power switch state detection output. · Becomes Hi with power switch ON.
55	–	–	–	–
59	0	Hi	F.ADV	Frame advance mode control output.
60	0	Hi	PAUSE	Pause mode control output.
61	0	Hi	SEARCH	Visual search mode control output.
62	0	Hi	PLAY	Play mode control output. · Play/Audio Dub modes: Hi
63	0	Hi	RECORD	Record mode control output.
64	–	–	–	–

Servo LSI (IC604) Pin Specifications

Cylinder phase/speed control
Capstan phase/speed control
Tape speed automatic discrimination
Phase matching control
Vert. drive pulse generation
Noise processing still control
Capstan and cylinder speeds can be set without adjustment.

<table>
<tr><th>Pin</th><th>I/O</th><th>Active Level</th><th>Abbreviation</th><th>Function</th></tr>
<tr><td>1</td><td>–</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>2</td><td>I</td><td>Lo</td><td>GND</td><td>Grounds IC.</td></tr>
<tr><td>3</td><td>I</td><td>  </td><td>TRACKING</td><td>Tracking monostable multivibrator (Tracking MM) delay determination.
Tracking control connects here.</td></tr>
<tr><td>4</td><td>I</td><td>  </td><td>PB CTL</td><td>Playback CTL pulse input.
The input CTL pulse is supplied for the following applications.
· For play speed discrimination (not used in this unit)
· For capstan phase control during play (operated at 25 Hz)</td></tr>
<tr><td>5</td><td>0</td><td>Hi</td><td>SP/LP</td><td>SP mode discrimination output.
Hi only in SP.</td></tr>
<tr><td colspan="4">Tape speed discrimination outputs
· The tape speed during recording is determined by the input level at pin 9, and the tape speed during play is determined by the relation between the periods of the CTL and CFG pulses. The discrimination data source in each mode is as follows (not used in this unit).</td><td><table><tr><th>Mode</th><th>Discrimination Data Source</th></tr><tr><td>REC</td><td>Pin 9 input DC level</td></tr><tr><td>PLAY, SEARCH, DOUBLE SPEED PLAY</td><td>Relation between the periods of the CTL and CFG pulses</td></tr><tr><td>STILL, FRAME ADVANCE, SLOW</td><td>The discrimination data during play is held.</td></tr></table></td></tr>
<tr><td>6</td><td>I</td><td>Hi</td><td>HEAD SWITCH</td><td>Shifts the head switching pulse by 90° output from pin 31. (not used in this unit)</td></tr>
<tr><td colspan="5">7-8, 13-14 Still control pins (pin 13 is also used as a brake output in phase matching)</td></tr>
<tr><td rowspan="2">7</td><td>I</td><td>  </td><td>BRAKE PULSE WIDTH</td><td>Determines the width of the delay pulse at pin 8.</td></tr>
<tr><td>I</td><td>Hi</td><td>CYL/CAPSTAN STOP</td><td>Cylinder/capstan start/stop control. The cylinder and capstan motors rotate and Lo. (in play and record modes, etc.).</td></tr>
<tr><td rowspan="2">8</td><td>I</td><td>  </td><td>BRAKE PULSE TIMING</td><td>Determines the output timing of the brake pulse during still.
Quantitatively delays the fall of the SW 25 Hz pulse.</td></tr>
<tr><td>I</td><td>Hi</td><td>CTL REC INHIBIT</td><td>CTL recording is inhibited at Hi.</td></tr>
<tr><td>13</td><td>0</td><td>Hi</td><td>BRAKE PULSE</td><td>Outputs a brake pulse during phase matching and still mode.
· During phase matching
 
Matches the phases of the CTL pulse and vertical sync signal (SW 25 Hz)</td></tr>
</table>

Pin	I/O	Active Level	Abbreviation	Function
14	I		DRIVE PULSE WIDTH	Determines the width of the capstan drive pulse in the frame advance and still modes.
9	I	Lo	REC SPEED	Tape speed input during recording. Judges LP or SP according to input level Hi, or Lo, and outputs is to pin 5. Tape speed is set into SP when Lo.
10	I		CFG	CFG pulse input used for: · The capstan speed control signal. · Comparison signal in the record mode of the capstan phase control system (divided to 25 Hz)
11	I	Hi	SEARCH/F.ADV.	Hi sets the internal circuit to the search mode. Mid and Lo in the F.ADV mode determine F.ADV behavior. Mid stops the tape immediately when the F.ADV made is released. Lo executes noise band driving out operation when the F.ADV mode is released.
12	0		CAPSTAN PHASE	Capstan phase control output. Outputs the PWM wave (1,082 Hz).
15	0		CAPSTAN SPEED	Capstan speed control output. Outputs the PWM wave (8.6 kHz).
16	I	Mid	CAPSTAN PHASE ADJUST	Mid: The PWM wave output is fixed at 50% duty.
17	I	–	PAUSE/F.ADV	Pause, frame advance discrimination input. Hi: Frame advance Vcc/2: Pause
		Hi	F.ADV	· The frame advance pulse (DRIVE PULSE) is output from pin 18 (CAPSTAN SERVO) by the frame advance command transmitted from the system control μP in the frame advance mode.
		Mid	STILL (PB PAUSE)	· A brake pulse is output from pin 13 (BRAKE PULSE) to stop the capstan in the still mode.
17	I	Mid	REC PAUSE	· The tape is rewound approxs. 2 sec by the pause input in the record pause mode. The ASSEMBLE pulse is output from pin 36 when the pause mode is released, and meanwhile, phase matching of the CTL pulse is performed and at the same time, the recording of the CTL pulse/ audio/video starts with the correct timing. That is, recording/erasing is inhibited while the ASSEMBLE pulse is Hi, and recording is started at the fall of the pulse.
18-20		Capstan servo I/O pins.		
18	0		CAPSTAN SERVO	· Capstan phase/speed control sum output.
			DRIVE PULSE	· Frame advance pulse (DRIVE PULSE) output. Outputs a pulse with a width of 7 msec when the frame advance command (pin 17) is given from the system control μP in the frame advance mode.
19	I		CAPSTAN PHASE	Capstan phase control addition input.
20	I		CAPSTAN SPEED	Capstan speed control addition input.
21	I	Hi	PWM +B	Power supply for the PWM generator in the phase control system (40 mA)
22	I		fsc	4.43 MHz color subcarrier signal input. Divided up to 21 Hz to be used as the reference signal for the servo operation.
23	0	Hi	Vcc/2	Outputs a voltage half the power voltage (5V) applied to pin 41.

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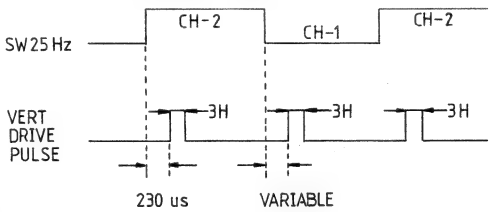
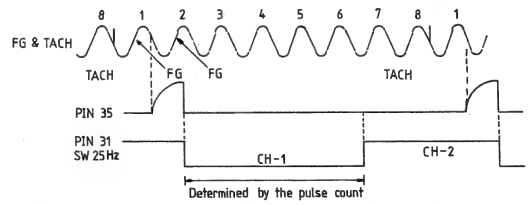
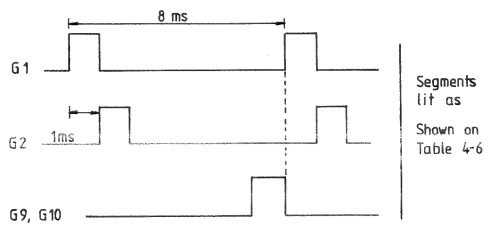
Pin	I/O	Active Level	Abbreviation	Function
24-28		Cylinder servo control circuit.		
24	0		CYL SERVO	Cylinder phase/speed control sum output.
25	I		CYL SPEED	Cylinder speed control addition input.
26	I		CYL PHASE	Cylinder phase control addition input.
27	0		CYL SPEED	Cylinder speed control output. Outputs a PWM wave (2,165 Hz).
28	0		CYL PHASE	Cylinder phase control output. Outputs a PWM wave (2,165 Hz).
29	I	Mid	REVERSE	Mid decreases the cylinder speed by 2.4 %. Hi sets the cylinder phase control PWM to 50 % duty cycle to disable the cylinder phase control.
30	I	–	REFERENCE	Fine adjusts the REF 21 frequency in the record mode.
31	0		SW 25 Hz	Head switching 25 Hz (SW 25 Hz) pulse output.
32	I	Mid	RECORD	Determines mode. · REC: Mid · PB: Lo
33	I		VERT DRIVE PULSE PHASE	Determines the vert. drive pulse generation timing for CH-1.
34	I		VERT DRIVE PULSE WIDTH	Determines the width of the vert. drive pulse (width: 3H).
35	I		TACH DELAY	Determines the delay of the tach pulse and the phase of the SW 25 Hz pulse.
36	0		VERT DRIVE PULSE	· Vert. drive pulse output. Outputs to suppress vertical jitter during trick play. Outputs the assemble pulse in the assemble mode. 
37	I		CYL TACH CYL FG	Cylinder tach pulse (25 Hz) and cylinder FG (200 Hz) common input. The CYL tach pulse is supplied to the cylinder phase control system. The CYL FG pulse is supplied to the cylinder speed control system. 
38	I		ASSEMBLE PULSE WIDTH	Determines the width of the ASSEMBLE pulse (audio/video recording inhibit output) during phase matching.
39	0		REC CTL	CTL pulse (25 Hz) output during recording.
40	I	Hi	+B	IC power supply (5V)
41	I		SYNC	· Vertical sync signal (50 Hz) is used as reference signal for cylinder phase control during recording. · H. Sync is used for detection of noise in the still mode.
42	–	–	–	–

4.10 Timer Control IC (IC101) Pin Specifications

M50757-686SP
Functions: Clock/timer, display control (channel, present time, programmed time display), 2-week/4-program (2-week/3-program and 1 weekly) timer

Pin	I/O	Active Level	Abbreviation	Function
52	I	Hi	+B	µP power supply pin
50-43		10-phase grid control outputs (Table 4-6)		
50 49 48 47	0	Hi	G4 G5 G3, G6 G7	G4 and G8 are used as a clock pulse for transmission commands from the key input µP to the timer µP. (Table 4-1). G6, G7 and G8 are commonly used as scan pulses for the timer functions change over key matrix. (Table 4-5).
46 45 44 43			G8 G9, G10 G1 G2	
35-42, 1		Segment control outputs		
35 36 37 38 39 40 41 42 1	0	Hi	a b c d e f g h i	
34	I	–	Vdisp	Negative power supply for display (-27V)
32	I	↑ ↓	DATA (K-T)	Receives the tuning, timer and system control commands from the key input µP.
31	I	H	VTR/ATR	Determines Audio/Video mode (Input)
30-29		Timer function key matrix input (Table 4-5)		
30 29	I I		MATRIX MATRIX	G6, G7 and G8 are applied to these pins via the matrix circuit to perform the specified functions.
28 27	0 I	– –	X'TAL X'TAL	Set µP reference frequency (32 kHz). Used at the clock pulse to increment the clock during power failure.
26	0	Lo	GND	Gronds µP.
25 24 23	0 0 I	– – –	X_{OUTS} X_{OUTF} X_{IN}	System clock oscillation. Circuit for Timer µP. Normal: 4MHz, during power failure: 40 kHz.
22	I	Lo	RESET	µP RAM reset input. · Displays »SUN 0:00 PF« with reset input.
21	–	–	–	GND
20	–	–	–	–
19	I	–	CLOCK	Basic clock pulse input for clock counting. · Detects power failure from lack of 2 clock cycles, and shuts off the display lighting output.
18	I	↑	REEL	Receives the reel pulses necessary to count the tape counter value.
15	0	Lo	MEMORY STOP	Memory stop output for tape counter. · Set to Lo for 100 ms when the counter changes to »0000« from »0001« during rewind.
13	0	Hi	DOLBY	Hi is output to activate the DOLBY function in the audio circuit. Hi/Lo of this pin is controlled by the Dolby switch S9906.

Pin	I/O	Active Level	Abbreviation	Function
12	0	–	TV/VTR	RF output selection control output. · Hi: TV · Lo: VTR (playing)
11	I	H	EST	Receives a trigger pulse from the take-up end sensor to reset the tape counter at the rewind end or beginning of forward tape running.
10	0	–	$\overline{TV}$/VTR	Not used
9	–	–	–	–
7	I	H	REVERSE	Receives »Hi« to make the tape counter down count during reverse tape running.
6	0	↑	ACK REMOTE	Not used
2	0	–	$\overline{VTR}$/ATR	Determines Audio/Video mode (Output)
3, 4, 5, 8, 14, 16, 17			Communication lins with other µPs	
3	I	↑	CLOCK	Timing pulse for data communication at pins 8 and 14 with system control µP.
4	I	↑ ↓	TU. REQUEST	Timing pulse for tuning µP to transmits the data (TU-T) to timer µP. The tuning µP starts data transmission at the fall, and timer µP receives the data at the rise.
5	I	–	DATA (TU-T)	Communication data concerning channel selection and tuning. 8 bit serial pulse.
8	I	–	DATA (S-T)	Communication data between system control µP and timer µP.
14	0	↑ ↓	DATA (T-S)	Transmits data to system control µP. Transfers data while synchronizing with the clock at pin 3.
16	0	↑ ↓	T. REQUEST	Timing pulse for timer µP to transfer the data (T-TU) to tuning µP. Starts transmission at its fall, and the tuning µP receives the data at its rise.
17	0	–	DATA (T-TU)	Communication data from timer µP to tuning µP. 8-bit seral pulse.

Table 4-5 Function of Timer Key Matrix

	G8		G7		G6	
CONNECTION	YES	NO	YES	NO	YES	NO
Pin 29 MATRIX 3	Disable GOTO function	Enable GOTO function	Reference clock from mains	Reference clock from Xtal	1 program /2 weeks	4 programs /2 weeks
Pin 30 MATRIX 2	Disable 8-minute timer	Enable 8-minute timer	60 times fast clock advance	Normal clock advance	Clock reference 60Hz mains	Clock reference 50 Hz mains

5.5 Tuning μP (IC701) Pin Specifications

Functions: Channel preset, Band/Channel selection, AFC/Muting control & Remote control

Pin	I/O	Active Level	Abbreviation	Function
1-4, 13		Control the EAROM		
1 2 3	0	Hi/Lo	C_3 C_2 C_1	EAROM operation control outpput. »WRITE«, »READ«, »ERASE« of data between EAROM and Tuning μP are controlled according to the state of these 3 pins. (Refer to Table 5-2).
4	0	↑	CLOCK	Timing pulse for data/address transfer between EAROM and Tuning μP.
13	I/O	–	DATA	Tuning data and address data communication line between Tuning μP and EAROM. The input/output are determined by the commands at pins 1, 2, 3, and the data are transferrred synchronized with the clock at pin 4.
5-8		Communicate with other μPs.		
5	I	–	DATA (T-TU)	Communication line of channel selection data, etc.
6	0	–	DATA (TU-T)	Communicates data in a single direction with Timer μP. The data in each line is 8-bit serial pulse.
7	I	↑	T. REQUEST	Timing pulse for Timer μP to transfer the data (T-TU) to Tuning μP. Tuning μP receives data at the rise of the pulse.
19	0	↑	TU. REQUEST	Timing pulse for Tuning μP to transfer the data (TU-T) to Timer μP. Timer μP receives data at the rise of the pulse.
9-12		Key scan outputs		
9 10 11 12	0	Lo	PHASE 3 PHASE 2 PHASE 1 PHASE 0	
14	0	Hi	DEFEAT	Defeat audio signal and AFC control output during channel selection. Sent to the IF circuit.
15	0	Lo	GND	μP GND pin.
16	0	Hi	AFC CONT	AFC control outputs. Hi: AFC ON Set to Lo with the BAND key or TUNING key is presses when presetting channels.
17 18	0	Hi	BAND 1 BAND 0	Band selection outputs. B_1 (17): VH Lo, VL Lo, UHF Hi B_0 (18): VH Lo, VL Hi, UHF Hi
8	I	Hi	FH DET	Channel preset operation is enabled to be finished, when Hi is applied.
20	0	–	TUNING (VT)	Tuning control PWM output. This PWM output is inverted and smoothed by the external circuit to obtain the tuning voltage.
21	I	–	IR PULSE	Remote control command input. Tuning μP decodes this and transfers the command code to System Control μP via Timer μP.
22	I	Hi	AFC	The AFC detector output is applied to this pin. The tuning μP compares this voltage with the REF voltage at pin 23 and controls the tuning voltage at pin 20. When the specified AFC voltage is applied to this pin while »Hi« is being applied to F_H DET pin 8, the tuning μP finishes search operation.
23	I	–	REF	The reference voltage which will be compared with the AFC voltage at pin 22 is applied to this pin. This pin is used to discriminate whether the AFC voltage is the specified or not.

Pin	I/O	Active Level	Abbreviation	Function
24 25	I 0	– –	OSC OSC	Set μP reference frequency. (4. OMHz)
26	I	Lo	RESET	Presets μP. Clears the data to 0 when the power plug is connected.
27 28	I I	Lo Lo	MATRIX 1 MATRIX 0	Matrix inputs. A receivable band is determined by the voltage levels applied to these pins. (Refer to Table 5-3).
29	–	–	–	GND
30	I	Hi	+B	Power supply pin (5V).

Table 5-2 EAROM Control Commands

C1, (3)	C2, (2)	C3 (1)	Commands and Details
Hi	Hi	Hi	STAND BY Command for the data register and address register to hold their contents.
Hi	Lo	Hi	ERASE Command to erase the address (channel number) data designated in the memory by the address register.
Hi	Lo	Lo	ADDRESS INPUT Command to transfer the address data to the address register.
Lo	Hi	Hi	READ Command for the data register to read the data out from the designated address.
Lo	Hi	Lo	DATA OUTPUT Command to output the data in the data register.
Lo	Lo	Hi	WRITE Command to write the data in the data register into the address area in the address register.
Lo	Lo	Lo	DATA INPUT Command to transfer the input data to the data register. The address register is held.

Table 5-3 Receivable Band

Pin 28 MATRIX 0	Pin 27 MATRIX 1	Receivable Band
Open	Open	VHF LOW, VHF HIGH, UHF
Ground	Open	UHF
Ground	Ground	VHF HIGH, UHF

Beocord VHS 91 Hi-Fi			
Type No.	4491	4492	4493
TV system	B/G VHF + UHF	I UHF	B/G All Band tuner + UHF
Colour system	PAL/SECAM modified	PAL	PAL/SECAM modified
Cassette format	VHS	VHS	VHS
Remote control system	Built-in, for Video Terminal	Built-in, For Video Terminal	Built-in, for Video Terminal
Tape heads	3 video, 2 Hi-Fi audio	3 video, 2 Hi-Fi audio	3 video, 2 Hi-Fi audio
Sound, compatible normal/Hi-Fi	Stereo, Hi-Fi sound	Stereo, Hi-Fi sound	Stereo, Hi-Fi sound
Stereo decoder			Stereo and bilingual
			TV-broadcasts
Max. playing time, audio/video	4 hours, E-240	4 hours, E-240	4 hours, E-240
Max. playing time, audio only	8 hours, E-240	8 hours, E-240	8 hours, E-240
Fast forward and rewind	Approx. 6 min. E-240	Approx. 6 min. E-240	Approx. 6 min. E-240
Still picture	Noise free, max. 6 min.	Noise free, max. 6 min.	Noise free, max. 6 min.
Step advance	1 frame	1 frame	1 frame
Search forward	4 x normal speed	4 x normal speed	4 x normal speed
Search rewind	4 x normal speeds	4 x normal speed	4 x normal speed
Counter	Electronic, 4 digits	Electronic, 4 digits	Electronic, 4 digits
TV channels	VHF 2-12, UHF 21-69	UHF 21-69	VHF 2-12, UHF 21-69
			S-channels S1-S20
Play channel	UHF 37, (adjustable 30-39)	UHF 37, (adjustable 30-39)	UHF 37, (adjustable 30-39)
Number of programmes	39	39	39
Time programming	3 programming	3 programming	3 programming
	up to 14 days	up to 14 days	up to 14 days
	in advance, or daily,	in advance, or daily,	in advance, or daily,
	+ 1 weekly	+ 1 weekly	+ 1 weekly
Picture			
Frequency range black/white	3.5 Mhz, -26 dB	3.5 MHz, -26 dB	3.5 MHz, -26 dB
Signal-to-noise ratio	43 dB (CCIR 421-2)	43 dB (CCIR 421-2)	43 dB (CCIR 421-2)
Hi-Fi sound IEC/DIN			
Frequency range	20-20,000 Hz ±3 dB	20-20,000 Hz ±3 dB	20-20,000 Hz ±3 dB
Dynamic range	>80 dB	>80 dB	>80 dB
Distortion	<0.5%	<0.5%	<0.5%
Channel separation	55 dB	55 dB	55 dB
Wow and flutter	<±0.005%	<±0.005%	<±0.005%
Normal sound			
Frequency range	70-12,000 Hz ±8 dB	70-12,000 Hz ±8 dB	70-12,000 Hz ±8 dB
Signal-to-noise ratio	>50 dB (Dolby NR ON)	>50 dB (Dolby NR ON)	>50 dB (Dolby NR ON)
	>42 dB (Dolby NR ON)	>42 dB (Dolby NR ON)	>42 dB (Dolby NR ON)
Wow and flutter	<±0.3%	<±0.3%	<±0.3%
Other data			
A/V, audio/video socket	21-pin	21-pin	21-pin
LINE IN, audio 7-pin dataling	50 mV/50 kohms	50 mV/50 kohms	50 mV/50 kohms
LINE OUT, audio 7-pin datalink	800 mV/600 ohms	800 mV/600 ohms	800 mV/600 ohms
Power supply	220 volts	240 volts	220 volts
Power frequency	50 Hz	50 Hz	50 Hz
Consumption at normal use	43 watts	43 watts	45 watts
Consumption at stand by	10 watts	10 watts	10 watts
Placement, min. height	22 cm	22 cm	22 cm
Ambient temperature	+10/+35 degrees	+10/+35 degrees	+10/+35 degrees
Relative humidity	30-80%	30-80%	30-80%
Dimensions W x H x D	48 x 10.5 x 37,5 cm	48 x 10.5 x 37,5 cm	48 x 10.5 x 37,5 cm
Weight	10 kg	10 kg	10 kg
Accessories			
Included	Aerial cable 6271134	Aerial cable 6271134	Aerial cable 6271134
Additional price	A/V cable 21-pin 6270285	A/V cable 21-pin 6270285	A/V cable 21-pin 6270285
Additional price	Table 3068	Table 3068	Table 3068

Subject to change without notice